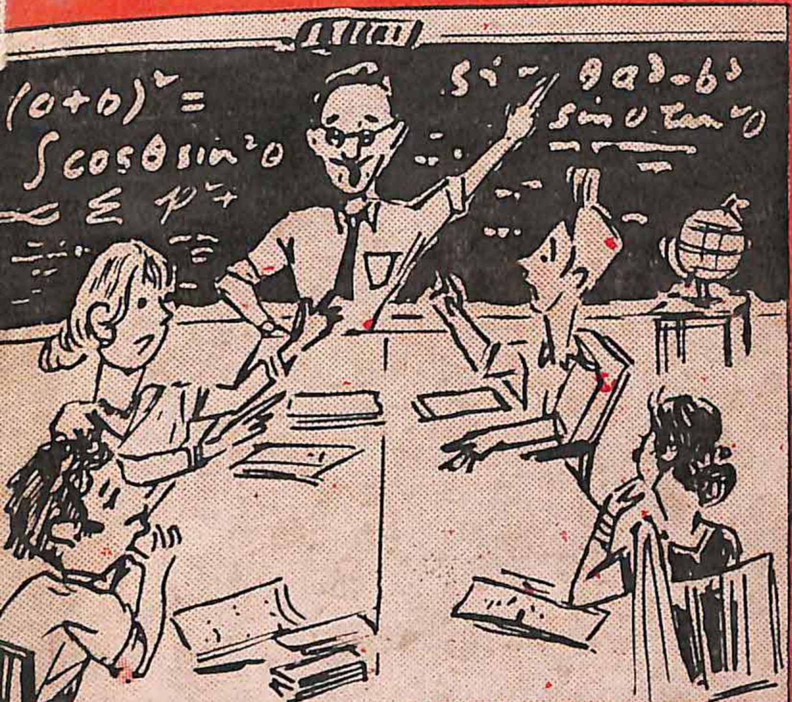
Interaction Analysis

theory & research



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NCERT

INTERACTION ANALYSIS:
THEORY AND RESEARCH

K. K. VASISHTHA

1982

Extension Services Department
Regional College of Education (NCERT), Ajmer.

EXTENSION SERVICES DEPARTMENT
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FOREWORD

WITH increasing demand of society on education, the programmes of teacher education have assumed significant dimension. The unprecedented explosion of knowledge poses tremendous challenge to the teacher education and its related programmes. The role of teachers and teacher educators in independent India has, therefore, changed considerably. The greatest concern of any teacher training institution should be to make teacher-education more intensive and purposive in order to turn out effective and competent teachers.

In this context, the class room verbal behaviour of teachers has recently emerged as an important field of study in the country. Various techniques are currently being tried out for modification of teacher behaviour which directly or indirectly make use of the mechanism of feedback. Attempts have been made to evolve techniques for obtaining objective and systematic feedback. The scientific mode of enquiry has centred round the systematic observation of teaching phenomenon. Interaction analysis has come up as a scientific method of unbiased recording, organizing and analyzing the spontaneous classroom behaviour permitting on account of each small bit of interaction. The data collected through this technique may be used for self analysis or analysis by peers or supervisors in the execution of individual skills resulting in the development of an insight and an intensified awareness of the teaching-learning situation.

Researches in the area of teacher behaviour with particular reference to interaction analysis has witnessed many educational innovations.

Flanders Interaction Analysis System (FIAS) and its various modifications have been tried out by Indian researchers. Some of them have sought to either modify the existing systems or to develop tbeir ownmodel. Regional College of Education, Ajmer system of Interaction Analysis (RCEASIA) is one such system developed by the author in collaboration with Mr. V. P. Agarwal, which has been extensively tried out by the the author and associates at this institution. Indeed, they have established its utility in Indian conditions. Attempts are still continuing to gather more and more empirical evidences related to matters of competence.

The present monograph by Dr. Vasishtha is presented in two sections: Part-I deals with interaction analysis-theory, in which conceptual aspects have been dealt with systematically alongwith procedures of quantitative and qualitative analysis of teacher-behavior; Part-II has been devoted to discussions on the research component, where recent trends in interaction analysis research in India have been identified on the basis of sixty research studies surveyed by the author. Suggestions for fruitful research in the area have also been offered.

It is hoped that this book will contribute towards overall affectiveness of teacher behaviour and would be able to give direction and guidance to researchers in the field of teacher education in general and teacher behaviour in particular; Concurrently, the Regional College of Education, Ajmer System of Interaction Analysis (RCEASIA) would be widely used by research scholars and teacher educators.

Suggestions for its further improvement shall be gratefully acknowledged. This book should be of immense value to post-graduate students in education, research scholars, teacher educators, educational planners and the educational community interested in the qualitative improvement of teacher education in the country.

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AJMER

PREFACE

Teaching is more than talking, but visits to a randomly selected number of classrooms will confirm the fact that the predominent instructional behaviour of the teacher is talk. Indeed, almost seventy percent of class room instructional time is spent in talk by either the teacher or student. Although teachers do not have an empirically verified and universally acceptable instructional theory to serve as a basis for their class room behaviour. Yet, enthusiastic teachers do realize that the quality and quantity of teacher-pupil interaction is a critical dimension of effective classroom teaching. The ways of objectively describing the nature of classroom interaction by capturing the elusive phenomenon of teacher's instructional behaviour, the classroom climate, and the effect of this climate on student attitude and achievement would lead to the development of the required instructional theory, which could help teachers generalize principles of intruction from specific instances,

Theory and research in Interaction Analysis would lead one to believe that teaching styles and patterns of verbal behaviour used by teachers to create a social-emotional climate in their classrooms have a direct effect on the attitudes and behaviour of their students. The extent of relationship between teacher verbal behaviours and teaching effectiveness can be adjudged vis-a-vis the definition of and the criteria used for defining effective teaching.

This book has been written to present an introduction to Interaction Analysis, its theory and research. Out of the two natural sections, the first part deals with basic concepts of interaction analysis, Flanders system of Interaction Analysis, encoding procedure, quantitative and qualitative analysis of the obtained data, modifications of FIAS and the Regional College of Education Ajmer system of Interaction Analysis (RCEASIA) and its theory. The second part delineates recent trends in interaction analysis research in India including a classification of studies under taken in the area, with a view to pointing out gaps and to identify needed research. However, it is pity that this book does not review and summarize the outstanding contributions made by researchers abroad. Of course this book is addressed to those who believe that the interaction between a teacher and his pupil can be improved.

The author is highly indebted to Professor N. Vaidya, Head of the Department of Education and Dean of Instruction, RCE Ajmer, who encouraged him to complete this work in a short span of time. Special mention must also be made here of the constructive suggestions and encouragement given by Dr. R. A. Sharma, Reader in Education, Institute of Advanced Studies, Meerut University, Meerut. Likewise the debt of gratitude is acknowledged to Mr. V. P. Agarwal, Lecturer in Education, RCE, Ajmer for his association with the author in the development of RCEASIA.

Mr. O. P. Sharma, Lecturer in Commerce, RCE, Ajmer and Mr. Akhilesh Sharma and Mr. Shiv Raj Singh Jadaun, M. Ed. Students also deserve mention for their assistance.

Author shall be failing in his duty if the sincere pains taken by Mr. P. M. Srivastava in designing the cover page and other materials and Mr. Ashok Mehta for taking a keen interest in the timely publication of the book are not gratefully acknowledged.

Finally, a word of thanks to Dr. S.N. Dutta, Principal, Regional College of Education, Ajmer for his foreword to the book.

It is hoped this book will be of benefit to teachers, teacher educators and research scholars devoted to the cause of education in general and teacher education in particular.

K. K. VASISHTHA

CONTENTS

FOREWORD

PREFACE

PART—I INTERACTION ANALYSIS : THEORY (1to51)

Introduction........................ 1

The Concept of Teacher Behaviour................................2

The Classroom Communication.....................................4

Assessing Teacher Behaviour 5

Interaction Analysis............... 5

Observational Systems.. 6

Selecting an appropriate system of Interaction Analysis 11

Flanders system of Interaction Analysis........................13

Assumptions inherent in Flanders system of Interaction Analysis...15

Observation procedure.......................... ... .16

The ground rules...17

Preparation of observation matrix..............................17

Interpretation of Interaction Analysis data.....................19

Interpretation based on Interaction Categories..................20

Interpretation based on areas...................................21

Interpretation based on behaviour ratios........................23

Interpretation based on Interaction Variables...................26

Qualitative analysis of Teacher behaviour......................28

Clockwise flow diagram...28

Box flow diagram...30

Interpretation based on Interaction model of critical teaching behaviours..31
Enrichment of Flanders Tool..32
Implications of Interaction Analysis .. ..,..................32
Some precautions with regard to the use of Interaction Analysis 33
Limitations of Flanders Interaction Analysis System............34
Modification of Flanders system of Interaction Analysis........35
Rationale for Regional College of Education Ajmer system of Interaction Analysis (RCEASIA)....................................36
Regional College of Education Ajmer System of Interaction Analysis (RCEASIA).... 37
Encoding process of classroom verbal Interaction...............43
Decoding process of classroom verbal interaction 43
Description of the behaviour ratios for RCEASIA.............44
Interpretation of Observations through RCEASIA..............47
Assumptions of Regional Collage of Education Ajmer system of Interaction Analysis (RCEASIA)................................47
Main features of RCEASIA.... 48
Limitations of RCEASIA.... 49
Science Teacher Behaviour Inventory.... 49

PART—II INTERACTION ANALYSIS : RESEARCH

(52 to 73)

Recent trends in Interaction Analysis Research in India

Introduction.... 52
Overview.... 53

Design.... 54
Methodology.... 54
Classification of studies ... .55
(i) Presag-process studies.... 56
(ii) Process studies.... 61
(iii) Process-Product Studies.... 67
(iv) Presage-Process-Product Studies ... .70
Needed research.... 71

PART—III BIBLIOGRAPHY ....(74 to 92)

PART—IV APPENDIX ....(93 to 111)

Appendix-1 93
Appendix-2 (i&ii).... 96-97
Appendix-3 98
Appendix-4 102
Appendix-5 104
Appendix-6 109

PART—I

INTERACTION ANALYSIS : THEORY

Introduction

The strength of any educational system largely depends upon the quality of the teachers who sustain it and also the educational planners and administrators who operate the system. The enigma of the measurement of teacher competence arises again and again in the discussions of educators, like an uneasy ghost stubbornly revisiting the seminar table, again and again such discussions trail off into acrimony or futility in the face of the controversy aroused by value judgments inhering the question, "What is the good teacher ?" The answer to this question implies two things, firstly what constitutes good teachers and good teaching and secondly how our teachers be enabled to perform their job of teachig in a better way. One the apparent ways of improving teaching is to strive for effective teacher preparation in teacher education institutions.

The large number of studies on teacher effectiveness carried out during the last two decades have made it more and more apparant that a competent teacher is one who possesses a large repertory of strategies and tactics which he can use at will vis-a-vis his puplis in the calssroom. And, therefore, he must first acquire an awareness of and control over his own behaviour, which is a necessary pre-requisite to teacher competence. Then he can go out into schools and develop his own way of being effective in his own situation. Becoming a fully competent teacher is, then, a life long process rather than a point to the reached.

The Concept of Teacher Behaviour

Teaching is a dynamic interplay between the tecaher and the nature of pupils. Also teaching is a goal directed activity. Gage has defined teaching as a system of actions intended to produce learning. Thus teacher has to perform various tasks. The more tasks teachers can accomplish, the better persons and professionals they are likely to become. Teacher behaviours may, therefore, be thought of as observable indications of a teacher's ability to perform tasks. But all teachers can not be expected to behave the same way in all situations. Because tasks vary, just as do teacher abilities, the behaviours teachers exhibit may be different from situation to situation The number of universally effective behaviours, if there are any, is small indeed. Ryans is quite correct when he defines teacher behaviour as the behaviour or activities, of persons as they go about doing whatever is required of teachers, particularly those activities which are concerned with the guidance or direction of the learning of others.

Mc Nergney and Carrier suggest that teacher behaviour (B) is a function (f) of the characteristics of the teacher or person (P), the teacher developmental environment (E), and the tasks (T) in which the teacher engages, or $B = (f)$ P, E, T.

The operational definition of teacher behaviour implies two important postulates:

(i) teacher behaviour is a social behaviour.

(ii) Teacher behaviour is relative.

Ryans has developed two assumptions necessary for a theory of teacher behaviour. The first assumption treats the teacher behavioual as a function of situationr factors and characteristics of individual teachers. This assumption seems to generate the following sub-assumptions:—

(i) Teacher behaviour is characterised by some degree of consistency.

(ii) Teacher behaviour is characterised by a limited number of responses.

(iii) Teacher behaviour is always probable rather than certain.

(iv) Teacher behaviour is a function of personal characterstics of individual teachers.

(v) Teacher behaviour is a function of general features of the situations in which it takes place, and

(vi) Teacher behaviour is a function of specific situations in which it takes place.

The second assumption takes the teacher behaviour to be observable and appears to have the following sub-assumptions.

(i) Teacher behaviours are distinguishable.

(ii) Teacher behaviour is measurable and classifiable both qualitatively and quantitatively and

(iii) Teacher behaviour gets revealed through overt behaviour.

Teacher behaviours, their nature, genesis and cultivation, their identification and their evaluation, constitute the core concern not only of teacher training institutions and school systems, but also of society at large that depends on teachers to a very great extent for the propagation of accumulated knowledge and culture values.

The Classroom Communication

The teaching learning situation has been viewed by different persons differently. The complexities of teaching and learning and theiy interrelationship, however, make asking the right research questions, let alone finding answers, an almost overwhelming undertaking. Research on teaching, according to Mitzel (1960) and Dunkin and Biddle (1974), has investigated four types of variables in order to understand and thus encourage effective teaching. These are discussed below:

(i) Presage variables—those characteristics that teachers carry with them to the classroom characteristics such as age, sex, training experience, and various personality traits such as motivation or intelligence.

(ii) Context variavles—these are the conditions to which teachers must adapt. Context variables include pupil characteristics such as age, sex, social class or abilities as well as characteristics of the school and community in which teaching and learning are embeded.

(iii) Process Variables—These are human transactions that occur in the classroom during the course of teaching and learning. They may include all observable behaviours of teachers and pupils directly related to teaching—learning activities as well as other seemingly unrelated observable behaviours of teachers and pupils.

(iv) Product variables—These represent outcomes of teaching as measured in terms of immediate pupil growth or long term pupil effects.

Teacher
Formative
Experience
Social Class
Age
Sex
Pupil
Formative
Social Class
Age
Sex

Assessing Teacher Behaviour

The complexity of the spontaneous behaviour of the teacher makes the study of class room teaching-learning a bit difficult. An accurate description of what happens in the classroom is not easy to obtain. Since we may be interested in evaluating teachers abilities to perform various tasks, systematic examination should provide overt indications of teachers needs and abilities as they are revealed in their work with students. Such an information may be further useful to make teachers more aware of their own behviour. and those of their students. The scientific mode of enquiry has centered on the systematic observations of the phenomenon. The works of Withal (1949), Flanders and Amidon (1960) Medley and Mitzel (1948) and Galloway (1968) have pioneered the utilization of systematized approaches in the study of the children in the classroom in the united states and around the world. Systematic observation is an accepted method of organising observed teaching acts in a manner which allows any trained person, who follows the stipulated procedures, to observe, record and analyse interactions with the assurance that others viewing the same situation would agree to great extent, with his recorded sequence of behaviours.

Interaction Analysis

The word interaction analysis refers to any technique for studying the chain of classroom events in such a fashion that each event is taken into consideration. The major concern of interaction analysis is the influence pattern of the teacher. The teacher behaviour may be exhibited as either verbal or nonverbal or both. Any system of interaction analysis is essentially a process of encoding and decoding i. e., encoding provides recording of the classroom events in a meaningful manner and decoding helps arranging the data in a useful display followed by analysis and interpretations. Interaction analysis is closely associated with the name of Flanders, whose masterful combination of known with new has led many to refer him as the 'Father' of interaction analysis.

Flanders system is concerned only with the verbal behaviour in the classroom. It is a category system having ten categories. One may question Flanders restriction of coverage in the ten categories of teacher behaviour thus chosen. It is a simple matter to offer criticism. Suggesting the means to obviate these criticism is much more difficult, however, Stones and Morris (1977) assert that the method offers considerable scope for the analytical appraisal of the teacher's classroom behaviour even if it does only focus on very broad aspects of verbal behaviour. Flanders represents an out-spoken defence of behavioural observation combined with the use of categorical checklist. He presents evidence to show that different patterns of interaction are obtained for teachers of varying abilities, subject matter and national contexts. Therefore, Flanders work seems to present a simple yet powerful method for studying teacher behaviour and should provide a wealth of evidence relating to matters of competence.

Observational Systems

A desire to understand more of what teaching is all about has been a motivating factor which led to the development of various systems of interaction analysis. A considerable amount of work has gone on in the last two decades in difining and developing methods of analysing classroom interactions and at present moment there are probably well over hundred systems. A number of tools are available in

Mirrors of Behaviour (Simon and Boyer, 1970). In fact, one of the problems of those interested in the field is that of keeping track of new observation instruments as they appear. There is, in addition, a propensity for research workers in the field to feel dis-satisified with existing systems for some reason or the other and to produce their own. It seems understandable, since very often such people have specific problems in mind which need instruments with differential emphasis suited to the problems they are investigating. It appears pertinent to conclude that a careful selection of interaction analysis system will help in increased understaning of classroom verbal interactions and in better genralizations.

Richard L. Ober, et. al. (1971) have classified observational systems into two basic kinds : Sign and category. A sign system is composed of 'list of behaviours' while a category system provides 'Classification of behaviours.' In a sign system, during a given period of time the observer simply checks, or marks in some manner each behaviour that occurs. Regardless of the frequency of occurance, the behaviour is checked only once during the observation period. On the contrary, in a category system, at regular intervals within the observation period the observer determines in what category the observed behaviour falls and records that category number. A behaviour is thus encoded as many times it occurs and also the sequence of occurance of various behaviours is recorded.

Though, Flanders system of interaction analysis has been a most popular instrument, may be due to its simplicity, it is not the only approach. For many researchers Flanders model has provided a basis. A select list of some observational systems is presented below:—

S.No.	Author	Year	Type	Focus
1.	Wright Stone	1935	Category	Newer Practices
2.	Jerseld et. al.	1939	Category	Evaluation of activity programme.
3.	H. H. Anderson	1946	Category	Teacher Contracts
4.	Withal.	1949	Category	Classroom Climate
5.	Bales	1950	Category	Emotional state
6.	Morsh	1956	Sign	Verbal and non-verbal interaction
7.	Smith	1959	Category	Cognitive interactions
8.	Ryans	1960	Sign	Teacher characteristics
9.	Medley and Mitzel	1961	Sign and category	Verbal and non-verbal behavious of teacher graduates

S.No.	Author	Year	Type	Focus
10.	B. O. Smith et. al.	1962	Category	Cognitive interactions
11.	Flanders	1963	Category	Verbal influence patterns of teachers
12.	Amidon and Hunter	1963	Category	Modification of F. I. A. C. S.
13.	Hough	1966	Category	-do-
14.	Amidon	1966	Category	-do-
15.	Bellack et. al.	1966	Category	Pedagogical significance of verbal interactions
16.	R. L. Ober (Receiprocal category system)	1967	Category	Socio-Emotional climate of classroom
17.	Brown et. al. (Florida Taxonomy of Cognitive behaviours)	1967	Sign	Levels of cognition

S.No.	Author	Year	Type	Focus
18.	Charles M. Galloway	1969	Category	Non Verbal Communication
19.	Goldhammer	1969	Category	Clinical Supervision (Stenographic notes)
20.	Bentley, Miller and Georgia (Equivelent Talk Categories)	1970	Category	Levels of cognitive interchange
21.	Kounin	1970	Category	Classroom management and discipline techniques
22.	Blumberg	1970	Category	Behavioural interaction of supervisors and teachers in conference situations (Flanders and Bales based)
23.	John P. Smith	1971	Sign	Verbal interaction in Science Teaching
24.	Hall (IAST)	1972	Category	Extended FIACS
25.	Morine	1973	Sign	Analysis of Taped episodes (personally and inductively Constructed)

Selecting An Appropriate System Of Interaction Analysis.

As hundreds of the systems of interaction analysis are available and many more can be developed, it is important to understand why a particular system should be used. The various observational systems may be different to each other on the following basis :

i) Purpose of observation or focus

ii) Encoding procedure

iii) The nature of persons, content to be subjected to observation

iv) Analysis of data.

No system can be described as a fool-proof one. Each one has its own limitations and may be appropriate for a particular set of situations/condition. The criteria for selecting or creating an appropriate system should include following considerations :

a) Validity of observations : The observation system should measure the intended teacher/student behaviours as nearly as possible. It implies that it should contain unambiguous observational items, which should reflect the reality of classroom communication. The user must be clear in his mind as to what kind of conclusions he wishes to make out of these observations and whether the observational items of a particular system are relevant to this objective.

b) Reliability of observations : Inorder to generalise about the patterns of classroom communication, the interaction should be consistently encoded.

Consistency in observations can be attained if the observer is well trained and is consistent in his or her perceptions of behaviour. When more than one observers are employed in data collection, consistency must be maintained between or among two or more observers. For purposes of internal consistency the unambiguous items in an observational system can ensure accurate interpretations. The index of intra and inter observer reliability may be computed by using the scott's formula.

$$\text{Reliability} = \frac{\text{Po}-\text{Pe}}{1.00-\text{Pe}}$$

$$= \frac{\text{Total agreement between observers} - \text{chance agreement}}{\text{Greatest possible agreement} - \text{chance agreement.}}$$

c) Usability of the system : In any system to be employed for classroom interactions, observation must be usable and must yield useful data, which could be easily interpretable. Medley and Mitzel (1963) point out that a category system is preferable when there is only one aspect of behaviour to be studied. When several aspects of behaviour are of equal importance and also when it is not known which aspects are important, the sign approach is preferable. Also it is now evident that category systems have been relatively more popular for their usability and yielding data useful for more complex analysis.

It should also be borne in mind while selecting an observational system that these do not evaluate but provide data that can be helpful in evaluation, but in and of themselves, are not evaluative instruments. Hence one of the most important aspects of learning to use an observational system is learning to use the results. The data obtained by these observational systems may provide meaningful feed back to teachers as it can provide teachers an opportunity to compare their performances with their intentions or objectives, which would form a basis for bahaviour modification. The ultimate value of observation system is, however, the use a teacher makes of the skills and awareness he develops. Therefore, the basic qualification of an observational system will depend upon its capability to help operationalize teaching objectives into teaching strategies.

Flanders system of interaction analysis

Flanders and his associates developed a classroom observational system at the university of minnesota between 1955 and 1960. An attempt has been made to categorise all forms and facets of verbal behaviour to be found in the classroom. Flanders system investigates the verbal behaviour of a teacher and students in a classroom setting inorder to enhance understanding and thus improve teaching behaviour (Amidon and Flanders, 1971). The Flanders system (provided in Appendix-I) is composed of ten categories of verbal behaviour. These are divided into three major sections. Teacher Talk, Pupil Talk and silence and confusion.

The first main section is sub-divided into two : indirect and direct teacher talk. This classification gives central attention to the amount of freedom that teacher grants to the students. In a given situation, therefore, a teacher has a choice. Indirect teacher statements are those that give students greater opportunity to respond or maximize students freedom of action. They include the following verbal behaviours; accepeting feelings (category 1), praising or encouraging(category 2), indicating an acceptance of students' ideas by paraphrasing, restating, or summarizing what they have said (category 3), and asking questions (category 4), In contrary to indirect teacher talk, direct teacher statements are those which tend to restrict or minimize students' freedom of action. They include lecturing (category 5), giving directions for student compliance (category 6), and criticising or justifying authority(category7),by telling students, in effect, to change their behaviour. These first seven categories are used when teacher is talking. The teacher's choice conscious or unconscious, depends upon many factors. It emanates from his perception of the situations and the goals of the particular learning situations.

The second main section is divided into only two categories. Pupil Talk—response (category 8) and Pupil initiation (cetegory 9), Pupil talk-response includes students responses to teacher's questions that may be narrow or convergent. Pupil talk-initiation category is meant for verbal behaviour, which may be an expression of a student's own opinions, ideas and inquisitiveness. This type of behaviour may occur as a result of broad or divergent questions.

The third section is composed of a single category of silence/confusion (category 10), this includes all behaviours not covered above, alongwith silence and garbled classroom communication.

The FIAS is summarized below in Table-1

Table-1

Summary of Flanders Interaction Analysis categories

Teacher Talk	Indirect influence.	1. Accepts feelings 2. Praises or encourages 3. Accepts or uses pupil ideas 4. Asks questions
	Direct Influence	5, Lecturing 6. Giving directions 7. Criticising or justifying authority
Pupil Talk		8. Pupil talk-response 9. Pupil Talk-initiatiou
		10. Silence or confusion

Assumptions inherent in Flanders System of Interaction Analysis

Certain assumptions are inherent in Flanders System of interaction analysis. They are: —

i) In a normal classroom situation. it is verbal communication which is predominent. Probabilities are, in any school classroom better than 60 percent that one would hear some one talking (Flanders, 1965).

ii) Verbal behaviour can be observed with higher reliability than most non-berbal behaviour and also it can reasonably serve as an adequate sample of the total behaviour in the classroom.

iii) The teacher exerts a great deal of influence on the pupils. Pupils behaviour is affected to agreat extent by the type of teacher behaviour exhibited (Anderson et. al. 1946). In other words teachers classroom behaviour in particular exerts a crucial influence on pupils (Flanders, 1960).

iv) Changing teacher classroom behaviour through feedback is possible (Flanders, 1963) though the amount and nature of change will require research (Flanders, 1963, 1968). The implication is that teachers can control their verbal participation in the classroom and use it as a psychological force in classroom management.

Observation procedure

Flanders system of interaction analysis is employed by a trained observer, Whether he/she is using a live classroom or a tape recording of his observations, it is desirable to take about five minutes to get acclimatized to the classroom situation and start recording. This recording is called encoding process. It is done by noting down every three seconds the category number of the interaction, he/she has just observed. The observer records these numbers in a sequence in a column. Twenty numbers per minute would thus be recorded. Therefore, at the and of a period of time several long columns may be obtained. It is important to keep the tempo as steady as possible, but it is even more crucial to be accurate, marginal notes may also be mentioned, which may be useful in explaining the classroom events. Once an observer memorizes the categories and practices them on transcripts of dialogue and live examples, use of the system becomes fairly automatic. Flanders suggests that 6 to 10 hours of practice to an observer can equip him in making appropriate judgments easily and consistently. The sample recordsheet is provided in Appendix-2.

The Ground Rules

In order to overcome complexity of problems involved in categorization, several ground rules have been established. These rules are helpful in obtaining consistency in observing classrooms in different subject areas and grade levels.

Rule 1. When not certain to which two or more categories a statement belongs, choose the category that was numerically far from category 5.

Rule 2. If the primary tone of teacher's behaviour has been consistently direct or consistently indirect, don't shift into opposite classification unless a clear indication of shift is given by the teacher.

Rule 3. The observer must not be concerned with his own biases or teacher's intent.

Rule 4. If more than one category occurs during the three seconds interval, then all categories used in that interval should be recorded. Therefore, record each change in category. If no change occurs within three seconds, repeat that category number.

Rule 5. For silence longer than three seconds, record 10 for every three seconds.

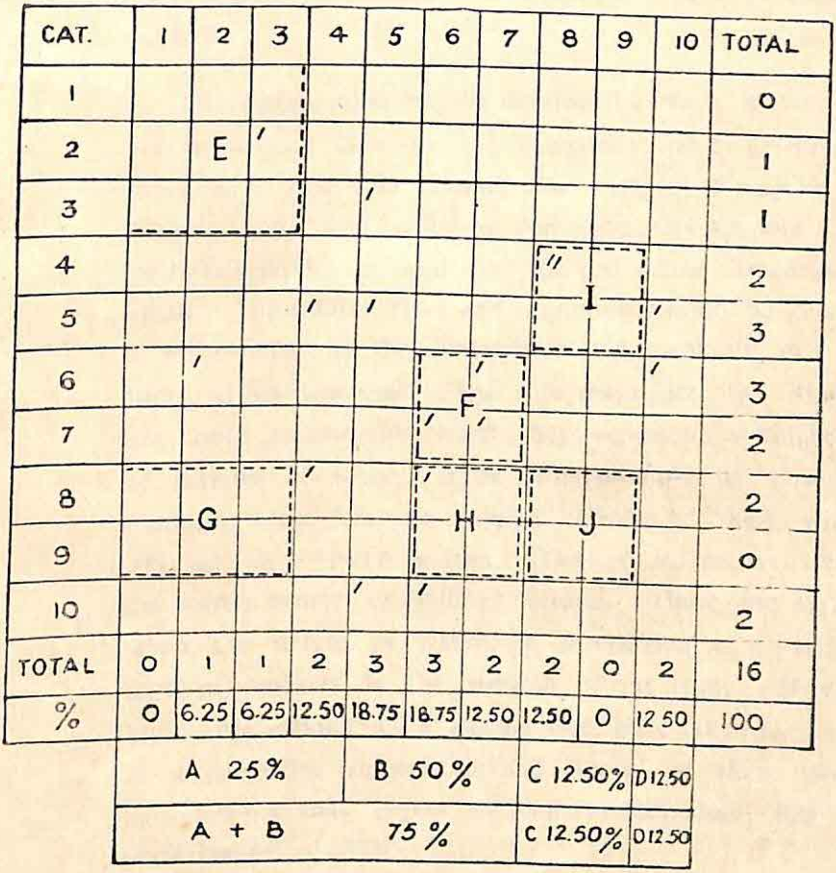
Preparation of observation matrix

Constructing an interaction matrix from raw data from the recorded sequence of events is relatively simple and straightforward. The method consists of entering the sequence of numbers into ten by ten matrix (10 raw by 10 column table). Each number is entered in the form of sequence pairs, being used twice, firstly as the first number and secondly as second number. The rows of the matrix represent the first number in the pair and the columns represent the second. In this way overlapping pairs of observations are entered in appropriate cells of the matrix. The data should begin and end in silence i.e., category 10. If 10 is not mentioned in the beginning and at end, the observer may add it at both ends. The following example will clarify the procedure of matrix preparation.

Recorded Sequence of class room interaction

I Pair 10
5 II Pair
4
III Pair
8 IV Pair
4
V Pair
8 VI Pair
6
VII Pair
2 VIII Pair
3
IX Pair
5 X Pair
5
XI Pair
10 XII Pair
6
XIII Pair
7 XIV Pair
7
XV Pair
6 XVI Pair
10

TABLE—2



CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1											0
2		E	/								1
3					/						1
4								//	I		2
5				/	/					/	3
6		/				F	/			/	3
7						/	/				2
8		G		/		/ H			J		2
9											0
10					/	/					2
TOTAL	0	1	1	2	3	3	2	2	0	2	16
%	0	6.25	6.25	12.50	18.75	16.75	12.50	12.50	0	12.50	100

A 25%	B 50%	C 12.50%	D12.50
A + B 75%		C 12.50%	D12.50

OBSERVATION MATRIX TABLE

The first sequence pair, 10-5 would be tallied in the cell located at the intersection of 10th row and 5th column, the next pair 5-4 will be tallied in the cell located at the intersection of 5th row and 4th column, and so on so forth. Each pair of numbers overlaps with the previous pair, and each number except the first and the last, is used twice. The procedure is Illustrated in the following teble-2.

The matrix table may be developed in such a way that the rows and columns for categories are proportionately sized e.g , row and column for category 5 may be kept biggest, rows and columns for categories 4,6 and 8 may be relatively smaller and for the rest of the categories still small. The total in rows and columns should be identical. It will provide as the first check. A separate matrix is prepared for each specific lesson or major activity. Matrices are more meaningful when they represent a single type of activity of work. It is also possible to pool the matrices. Matrices are pooled cellwise. There will be 100 cells in a 10x10 matrix. The pooled matrix is called the master matrix or millage matrix. These are required when the nature of classroom interaction of a particular type of teachers is the subject of our study. If two or more observations of a teacher have been taken for lessons in a particular subject, pooled matrix of these two or more lessons may depict the data of individual's aggregate performance.

Interpretation of Interaction Analysis Data.

Amidon and Flanders (1971) have suggested that the investigator should avoid reference to matrix until he/she had formulated a question about the interaction data.

Also a trained observation consultant should be involved in interpretation of data. Some probable questions are mentioned below:

i) what is the relationship of teacher talk to pupil talk ?
ii) Is the teacher typically direct or indirect ?
iii) How much class time was spent on lecturing ?
iv) Does the teacher generally asked narrow or broad questions ?
v) How does the teacher typically communicate the subject matter ?

The process of interpreting data is often called as Decoding process. In order to answer certain questions about classroom communication decoding may be done at the following levels.

(A) Quantitative Analysis of Teacher Behaviour
  i) Interaction categories.
  ii) Areas of interaction.
  iii) Behaviour ratios.
  iv) Interaction variables.
(B) Qualitative Analysis of Teacher Behaviour
  i) Clock wise flow diagrams.
  ii) Box flow diagrams.
  iii) locating the interaction models of critical teaching behaviours.

i) Interpretation Based on Interaction Categories

The simplest way of interpreting the data is based on categories. The column total represents the use of various categories. It may be converted into percentages. The relative importance given to the use of various categories by the teacher may, therefore, be ascertained. This information can be used to provide feed back for further class room interchange in the light of the consultants suggestions or introspection.

ii) Interpretation Based on Areas

Flanders (1963) has suggested interpretation on the basis of ten areas.

Areas have been marked in Table-2. The numbers used in singular such as 1, 2, 4, 8, 10 etc., represent the totals of respective columns and numbers used in pairs such as (4-8), (5-5) and (10-6) represent cell frequencies of corresponding cells.

Area A : This is the total of first four categories in the matrix, which represents the indirect influence. Percentage of teacher statements falling into categories 1, 2, 3 and 4 is calculated.

Area B : This represents direct influence or the percentage of teacher statements falling into categories 5,6 and 7. Operationally it is the total of categories 5,6 and 7.

Area C : This represents percentage of pupil talk and is the total of categories 8 and 9.

Area D : This represents the percentage of silence/confusion and is calculated from the category 10 in relation to total tallies.

Area E : This represents a nine cell area involving categories 1,2 and 3. The percentage of Tallies in nine cells namely (1-1), (1-2), (1-3), (2-1), (2-2), (2-3), (3-1), (3-2) and (3-3) with respect to total tallies gives an index of teachers' dealing with students on affective plane by integrating content with students ideas and feelings.

Area F : It is a four cell combination of categories 6 and 7. This area is sensitive to difficulties that teacher may have with classroom discipline, students, compliance of teacher's directions and teacher domination of supervision of student - activities. The percentage of cells (6-6), (6-7), (7-6), and (7-7) is computed for this purpose.

Area G & H : These are based on tallies when student stops talking and teacher starts. Area G is a six cell combination (8-1), (8-2), (8-3), (9-1), (9-2), and (9-3), which indicates those instances in which teacher responds to the termination of pupil talk with indirect influence. The percentage of the total of these six cells provides this index (Area G).

Area H is a four cell combination (8-6), (8-7), (9-6) and (9-7) which indicates the teacher's responding to the termination of pupil talk with direct influence.

An interesting comparison can be made by contrasting the proportion of G & H (G/H) with proportion of A & B (A/B). If these two proportions are quite different, flexibile teacher influence may be concluded.

Areas G and H together fascinate teacher. They are often knowing more about their immediate response to students participation. The study of Area G with E and H with F may help in studying that how long indirect or direct influence following the pupil talk was sustained.

Area I : It indicates an answer to the question, what type of teacher statements trigger students' participation ?

It is a four cell combination (4-8), (4-9), (5-8) and (5-9). Usually a high loading in cells (4-8) and (4-9) is expected. A high loading in cells (4-8) and (8-4) indicates teacher directed quick drill.

Area J : This represents the sustained pupil initiation or response or one followed by the other. The four cells involved are (8-8), (8-9), (9-8) and (9-9). It is considered with area I to know the impact of teacher's statements on pupils' responses or initiation.

An above average frequency in area C but not in area J will indicate short answers, usually in response to teacher stimulation.

(iii) Interpretation Based on Behaviour Ratios

One of the rigorous analyses used for research purposes is the interpretation of teacher pupil interaction in terms of Behaviour ratios. This method requires a simple ratio based on the average of two observation matrices. The computation formulae have been provided in Appendix—3. The 16 Behaviour ratios are discussed in brief in the following paragraphs :

1. Teacher Talk (TT) : It is the percentage of categories 1 to 7. (Please refer to Area A+B).
2. Indirect Teacher Talk (ITT) : It is the percentage of categories 1 to 4 (Please refer to Area A).
3. Direct Teacher Talk (DTT) : It is the percentage of categories 5 to 7 (Please refer to Area B).

4. Pupil Talk (PT) : It is the percentage of student talk falling into categories 8 and 9 (Please refer to area C).

5. Silence or Confusion (SC) : It is the percentage of category 10 (Pleass refer to Area D).

6. Indirect to Direct (I/D) Ratio : It represents the proportion of Indirect influence to Direct influence, i e., the proportion of categories 1, 2, 3, and 4 with categories 5, 6, and 7.

7 Small Indirect to Direct (i/d) ratio : it represents the proportion of pure indirect influence to pure direct influence i.e. the proportion of categories 1, 2, 3 with categories 6 and 7.

8. Pupil Initiation Ratio (PIR) : It is the percentage of Pupil-talk judged by the observer to be an act of initiation i.e. the proportion of the use of category 9 with respect to 8 and 9.

9. Teacher Responce Ratio (TRR) : It represents an index of teacher's tendency to react to the ideas and feelings of students. In other words, it is the percentage of the use of categories 1, 2 and 3 with respect to categories 1, 2, 3, 6, and 7.

10. Teacher Question Ratio (TQR) : It is defined as an index representing the tendency of a teacher to use questions when guiding more content oriented part of the class discussion. Therefore, it is calculated by finding the percentage of category 4 against a total of categories 4 and 5.

11. Content Cross Ratio (CCR) : The CCR indicate the extent to which focus of discussion has been on the subject matter. It represents the proportion of the classroom activity related to the teacher's questions

and lecturing with respect to his/her total classroom interaction.

12 Steady State Ratio (SSR) : This represents the teachers' tendency to sustain a particular type of classroom communication. It is an index of rapidity of interchange between teacher and the pupil. Computationally it is the percentage of the frequencies in steady state cells i. e. (1-1), (2-2), (3-3), (4-4), ...(10-10).

13. Pupil Steady State Ratio (PSSR) : It is an even more sensitive index to a rapidity of the pupil interchange when pupil talk is average or above average. It is the percentage of cells (8-8) and (9-9) out of Categories 8 and 9.

14. Instantaneous Teacher Response Ratio (TRR 89) : It is an index of the teachers' tendency to praise or integrate pupil ideas and feelings into the class discussion when pupil stop talking It represents the percentage of the events of classroom communication involving pupil-response or initiation followed by accepting feelings, praise and uses pupil ideas out of such classroom interaction events including pupil response or intiation followed by directions and criticisms as well.

15. Instantaneous (Teacher) Teacher Question Ratio (TQR 89) : It is an index of Teachers' tendency to respond to pupil talk with questions based on his own ideas, compared to his tendency to lecture. It is percentage of the events of classroom communication involving pupil response or initiation followed by questioning to pupil response or intitiation followed by lecturing as well.

16. Vicious Circle (VC) : It is an index of Teachers' restrictive behaviour involving directions and self justification, which is sensitive to difficulties faced by the teacher when the students are not complying satisfactorily. It is the percentage of classroom events namely sustained direction, sustained criticism, direction followed by criticism, and criticism followed by direction out of total classroom communication.

(iv) Interpretation Based on Interaction Variables

Another sophisticated analysis can be attempted on the basis of interaction variables. These variables have been considered by Flanders himself for extracting the factors of classroom interaction. These are computed in the manner of computation of behaviour ratios, however, they provide still deeper probe into the nature of classroom communication. Ten interaction variables are being described in brief. The symbols and formulae for interaction variables have been provided in appendix-4.

1. Indirectness (i/i+d) : It is an index of the teachers' indirect behaviour. Teachers' tendency to the indirect behaviour while emphasis on content is of secondary importance. It represents the percentage of Teacher statement classified as categories 1, 2, 3, out of a totality of Teacher statements repressented by categories 1, 2, 3, 6, and 7.

2. Sustained Acceptance (3-3 Cell) : It is the percentage of accepting and using pupil ideas in a sustained fashion i.e. the proportion of the sustanied use of category 3 with total use of category 3.

3. Indirect influence (Columns 1, 2, 3, 4) : It is the same as area Aor Behaviour ratio Indirect Teacher Talk (ITT) described in the earliar section.

4. Question (Column 4) : It indicates the tendency of teacher to use questions during classroom communication, It represents the percentage of category-4.

5. Teacher Talk (Column 1 to 7) : It is the same as area (A + B) or behaviour ratio teacher talk TT) described in the earliar section.

6. Restrictiveness (Column 6 & 7) : It presents an index of teacher's tendency of being authoritarian in classroom communication. It is the percentage of teacher statement classified as Categories 6 and 7.

7. Restrictive Feedback [(8-6), (8-7), (9-6), (9-7) Cells] : A more sensitive index of restrictivness is restrictive feedback. It reflects the teacher's tendency to use directions and criticism, when pupil stop talking, It is the percentage of the events of classroom communication involving pupil response or initiation followed by directions or criticisms out of total directions and criticism used by the teacher.

8. Negative authority [(6-7) (7-6) Cells] : This pertains to teacher behaviour indicative of classroom discipline problems faced by the teacher and being dealt with negative attitude curbing the freedom and initiative of students. It is the percentage of events of direction followed by criticism and criticism followed by direction out of total direction and criticism used by the teacher.

9. Praise (Column 2) : It indicates the tendency of teacher to use praise/encouragement during class-

room communication. It represents the percentage of Category 2.

10. Flexibility (High i/d-Low i/d) : It is an index of flexible Teacher behaviour. It represents the difference in highest and lowest i/d ratios if more than one observations of classroom interaction are analysed. The teacher's tendency to adapt to thr classroom climate is reflected. It is, therefore, a measure of Teacher resourcefulness and quick judgement of the situation.

Qualitative Analysis of Teacher Behaviour

The earlier described analyses provide explanation in quantitative terms only. In order to understand the nature of classroom interaction qualitatively, it is essential to prepare The clock wise flow diagrams and Box flow diargams of the matrix display for pooled observations. The flow of beha viour would be the theme of study.

Clockwise Flow Diagrams

A clockwise flow diagram provides a visual display of the chain of classroom interaction. Robert F. Mc Nergney and Carol A Carrier (1981) have mentioned that one of the disadvantages of analysing data from Flanders' system is that the element of sequence is lost. However, it is true to the quantitative analysis only. While attempting for qualitative analysis through clockwise flow diagrams and box flow diagrams the sequence of classroom events is regained in more generalised form which should be more acceptable for understanding the nature and structure of classroom verbal behaviour. Flanders has described four important features of the process as noted below:

1. Flow diagrams are helpful in making comparisons between two matrices or a matrix with normative expectations in order to find similarities and differences between two segments of interaction.

2. The inferences about the sequence of events ("What event precedes") and ("What event follows") can also be made. The transition of events and state of steadiness may also be located. The understanding of relationship between rows and columns helps in deriving probability statements about flow of events in teaching. Such an analysis has proved to be of significant importance in providing feedback to science teachers (Vasishtha—1979).

3. In encoding, Code symbols denoting behaviour events provide a "Vocal short hand" which is meaningful when displayed on a matrix table. The communication patterns can easily be read in a few minutes with the help of clockwise flow diagram.

4. The speculative descriptions of interaction must be logically constructed with situational setting.

The procedure for drawing a flow chart requires the knowledge of clockwise rotation of events and the differences between rows and columns. To follow this procedure, it is required to draw a blank matrix form consisting of ten rows and ten columns, each properly labelled. The highest cell frequency in the matrix is searched and located. The cell of the highest freqency is the starting point of the flow diagram since it is the sequence pair which occurs most often. The highest cell frequency is circled. This marked cell will be the starting point for resonstructing the flow of events. Most often the cell with the highest frequency will be (5-5) cell. However, it is possible for another cell to have the highest frequency and to become the starting point.

Once the starting point is located, the next step is to locate the event which is most likely to follow. This is done by inspecting the row which is designated by the second number in the address of the starting cell, the unmarked cell with the highest frequency is located and circled. Next step is to connect these two marked cells with a little looping arrow.

The highest frequency should be noted only upward side from the second step so that clockwise flow may be presented. After locating the third point the highest cell frequency is noted by inspecting the row towards the right side of the column and is marked by a circle. The fourth point is connected by drawing a little looping arrow from the third step. This prodedure is followed for preparing the clockwise flow diagram. These marked cells and arrows help to clarify the sequence of events and make the matrix display more understandable. This obtained diagram is termed as clockwise flow diagram of classroom interaction.

Box Flow Diagram

Flanders observed that the clockwise flow diagram of classroom interaction was still incomprehensible and it was possbile to draw a diagram which looks just little less complicated, and is named as a box flow-diagram.

It attempts to use space in ways that are proportional to the traffic pattern.

The steady state pairs are drawn separately related to teacher talk and pupil talk. The size of steady state pairs box is proportional to the number of frequency of the cell. These boxes ore connected by looping arrow by inspecting the frequency of the cell, what precedes and what follows. The thickness of connecting arrow should also be proportional to the frequencies of the cell. Thus a box flow diagram is prepared. It may be more helpful in understanding the nature and structure of verbal behaviour of the teachers.

Interpretation Based on Interaction Models of Critical Teaching Behaviours

Flanders has described the interaction models of critical teaching behaviours by using the interaction analysis categories in his researches.

A critical teaching beaviour has been defined as a pattern of acts or the interaction models that : (a) are logically related to certain edcational outcomes, (b) follow a certain sequence with measurable probability, and (c) seem crucial in terms of a theory of teacher influence verified by past reasearch. He developed seven interaction models of critical teaching behaviour. These are quite typical of common practices in the classroom based on his research data.

The first three models involving more active teacher role are :

- i) High content emphasis under close teacher direction.
- ii) Teacher directed quick drill, and
- iii) Drill combined with lecture demonstration

The last four models involving more students' participation are noted below :

iv) Teacher gives direction with some clarification
v) Stimulating independent student thought,
vi) Attending to student feelings, and
vii) Teacher transitions from an affective to an intellectual emphasis,

These interaction models can be locoted in clockwise flow diagrams of classroom interactions and effective comparisons can by made. For detailed description readers may please refer to author's book, "Teacher Education in India : A study in New Dimensions (1979)", p. p. 140-145.

Enrichment of Flanders Tool

Flanders has encouraged observers to use subscripts when coding. According to Flanders, Werner, Elder, Newmen and Lai (1974) have identified an interesting and potentially valuable teaching concept noted as a subscript as because statement which is an explanation that accompanies a particular teacher statement. For example, if a Teacher were to say "Read chapter two because it suggests why measurement and evaluation is an integral part of any system of education ?". Statement would be encoded as 6b (giving directions with a because-extension). This because extension also applies to a teacher use of praise (2b) or Criticism (7b). So a b subscript may be encoded when teacher explains why he or she is praising or criticising. The positive impact of such teacher statements has been seen to be enhanced through research and practice.

Implications of Interaction Analysis

Flanders interaction analysis system has following implications :—

i) By concentrating upon Flanders system students obtain detailed in sight into the rationale of a tool for analysing classroom interactions.

ii) It brings to bear an analytic approach to understanding what infact goes on in the classroom.

iii) Flanders system being the most useful from the points of view of direct practical instruction and self instruction in the classroom techniques, has significance for teachers training in practical situation.

iv) It is hoped that students can practise and learn new teaching behaviours (implied in Flanders system) and thereby overcome the limitations of traditional teaching practice.

v) It is also hoped that once the student teachers understand how to study their own teaching and are able to get an insight into their own classroom performance, they will improve.

vi) It could provide idea for other different instruments designed to do specific jobs different from, for which the Flanders instrument was designed.

vii) Flanders system of interaction analysis can be used for research in verbal interaction for preservice and in service education of teachers.

viii) Being a potential tool of feed back, it helps in acquiring desirable patterns of teaching.

ix) This system devotes a great deal of attention to teacher talk (Seven of the Ten categories), especially provides for looming indirect and direct nature of the teachers verbal behaviour.

Some Precautions with regard to the use of Interaction Analysis

There are some precautions that can be taken with regard to interactiou analysis, they are as follows :

First, no interaction analysis data should be collected unless the person is familiar with the entire process and knows its limitations.

Second, the questions to be answered by inspecting the matrix should be developed before the observation takes place.

Third, value judgements about good and bad teaching behaviour are to be investigated so that cause and effect relationships can be discovered.

Fourth, a certain amount of defensive behaviour is likely to be present at the initial consultation, it is something like listening to a tape recording for the first time.

Fifth, a consultation based on two observations or at least two matrices help eliminate value judgement or at least control them. Comparison between the matrices is more likely to lead to principles.

Limitations of Flanders Interaction Analysis System

1. The system does not describe the totality of the class-room activity. Some behaviour is always overlooked and who is to say that the unrecorded aspects of the teaching act are more important than those recorded.

2. Efforts to describe teaching are often interpreted as evaluation of the teaching act and of the teacher. While descriptions may be used as a basis of evaluation, judgement can be made only after additional value assumptions are identified and applied to the data.

3. The system of interaction analysis is content free. It is concerned, primarily with social skills of class-

room management as expressed through verbal communication.

4. It is costly and cumbersome and requires some form of automation in collecting and analysing the raw data. It is not a finished research tool.

5. Much of the inferential power of this system of interaction analysis comes from Tabulating the data as sequence pairs in an 10 × 10 matrix. This is a time consuming process.

6. Once the high cost of tedious tabulation (Electric Computers) is under control, but the problem of training reliable observers and maintaining their reliability will still remain.

7. Its potential as a research tool for a wide application to problems is yet to be explored.

8. The system devotes little attention to student talk and focuses a great deal of attention on direct/indirect nature of Teacher's performance. It is considered a great drawback of Flanders System.

Modifications of Flanders System of Interaction Analysis

Although Flanders system of interaction analysis (FIAS) has been most widely used and occupies the place of one of the most popular techniques for observing classroom interaction. Many later tools developed abroad are simple modifications of Flanders' system. However, Indian researchers have rarely attempted to develop a tool of their own to effectively quantify classroom communcation. Besides the attempts of Verma and Ansari (1975), and Deva (1978), Vasishtha and Agarwal (1979) have developed an observational system based on Flanders model which is known as

Regional College of Education Ajmer System of Interaction Analysis (RCEASIA). This has been described along with its rationale in the following paragraphs.

Rationale for Regional College of Education Ajmer System of Interaction Analysis

1. The observational techniques specially Flanders interaction analysis system seems to have employed ambiguous categories and have less reliability about descrimination (Deva, 1978).
2. The systems do not describe to the totality of classroom activity. Some behaviours are always overlooked which might be important too.
3. Many systems including Flanders being content free, do not incorporate various essential steps of teaching that subject and concerned behaviours have to be arbitrarily categorised by the observer.
4. Under Flanders system 'silence' has been equated with 'Confusion' (Deva 1978). In others this category has been splitted into two separately. But provision for encoding classroom behaviour as purposive silence and non purposive silence/confusion seems to be missing altogether.
5. Although it is true that value judegements about good and bad teaching behaviours are to be avoided while using interaction analysis the, component of relevance is of genuine importance to be incorporated in such a system.
6. Certain activities like demonstrating an experiment in science, model reading in languages, map and

chart reading in social studies do not find appropriate Classification in various systems.

7. The Category 1 (accepts feelings) which has been given an independent status in various systems developed by Flanders, Hough and others. Actual observation of hundreds of the live classroom testifies its too less occurance. Moreover, it may get motivational value by way of approving pulils' actions and feelings only.

8. Category 4 (asks questions) of Flanders system has been a subject of regular criticism. Hence other modifications sought to divide it into 2 to 4 sub categories.

9. Managerial skills could not find appropriate place in various systems.

10. There is no check for unwanted expression either by teacher or students during classroom communication categorised by various observational systems.

Regional College of Education Ajmer System of Interaction Analysis

Flanders category system, in cource of time, gave rise to several studies and researches for modifications. Amidon and Hunter (1967), presented a modified version which retained the original 10 categories but included some ideas of other researchers so that more data might be collected and student teachers might discriminate more accurately their classroom behaviour. In this flexible modified version, Amidon and Hunter retained categories 1, 5, and 6 of Flanders and modified categories 2 using Hughes' (1959) idea of public and private criteria : 2(a) indicates praise like good, 'fine' etc. (2b) praise with some logical and explicit reasons, and (2c) indicates praise with his personal likes or dislikes or opinion. In category 3, Taba's (1964) levels of thinking-describing, inferring and generalizing, were used which would help the student teachers to think about their pupil's level of thinking and would enable them to be aware of their own responses. Category 4 was modified as per Gallagher and Aschner (1963), i. e. asking question of cognitive, memory, convergent, divergent and evaluative nature. Category 7 has been modified in the same way as category 2. Category 8 and 9 have been modified, as cetagory 3 by the addition of subheadings, description, inference and generalisation. It would help the student teachers to think about their pupils' contribution, to help them more from one stage to another and back up if necessary. Category 10 is divided into two categories silence and confusion. In fact the 10 categories of Flanders have been further analysed into 24 categories identifying the mutually exclusive spontaneous classroom behaviour. This 10 category system with the datails is particularly designed for use as a feedback tool to analyse one's own teaching, to think about and formulate question, to role play behaviours in college classroom, to observe teaching pattern and to diagnose teaching problems.

Vasishtha and Agarwal (1979) attempted to develop Regional College of Education Ajmer System of Interaction Analysis (RCEASIA), which has further modified the 10 category system to suit Indian conditions. The three major areas-Teacher Talk, Pupil Talk and silence have been retained. Teacher Talk has been further subdivided into indirect and direct influences as per Flanders system. Both Teacher Talk and Pupil Talk have been further subdivided into Response and Initiation. The details of the RCEASIA Categories are noted below.

Category : - Approves Pupil Action

It combines categories 1 and 2 of FIAS whereby the teacher not only approves, praises and encourages the responses of the pupils, but accepts his feelings, actions and behaviours. It includes all positive encouragement and feelings and provides verbal as well as nonverbal clues and reinforcements for providing enjoyable human relationship in the classroom situation conducive to better teaching and learning.

Category 2:— Utilises Pupil Ideas

It is in line with cetegoy 3 of FIAS but does not restrict itself to the simple acceptance of pupil ideas as in the FIAS but goes further in the clarification, rectification, summarization and elaboration of the pupil's ideas and responses in a positive direction. There is no shift from pupil' s ideas to the teacher's own ideas as in FIAS. Thus it provides greater freedom to the pupil not only to respond but to create, which the teacher utilizes for the accelaration of the teaching learning process.

Category 3:— Asking questions

This category is further subivided into two : (a) asks close-end questions and (b) asks open end qestions. When the questions are based on simple knowledge and comprehension or under standing, where the mental processes involved are of primary level emphasizing recall/recognition, see relationship or cite examples, differentiation, verification, generalisation etc., where drilling of structures and difficult words are conducted in the teaching of languages from known facts or textbooks, such behaviours are included in 3a. When higher mental processes like application, creativity, reflective thinking, judgement and decision making process are involved, 3b is used. This category has greater affinity to category 4 of the Amidon-Hunter modified category system which emphasizes simple cognitive memory, convergent, divergent and evaluative questions.

Category 4:— Demonstrating Activities.

This category describes both verbal and nonverbal behaviours of the teacher. One major difference is its emphasis on language teaching and humanities. Further, the experimentations and practical subjects, where non-verbal behaviour predominates have not been considered in Flanders as well as Amidon-Hunter Category systems.

Category 5:— Lecturing

This category of RCEASIA includes all the verbal behaviours of category 5 of FIAS and modified category systems. Besides the verbal exposition the teacher writes on the black board explaining his points, difficult words and expressions or works out a sum, draws a diagram while teaching science etc., such activities of the teacher which influence student behaviour and activities already omitted in the previous category systems have been taken care of as they go a long way in accelerating the teaching learning environment.

Category 6:— Managerial Activities :

This category includes directions, commands, orders or requests to create a healthy classroom situation. It is in line with category 6 of the FIAS and the modified systems.

Category 7:— Extra-Relevant and Irrelevant Activities :

This category is divided into two sub-divisions. In general it includes those activities that are not in consonance with the main objectives of the lesson. When the teacher provides wrong content or the level is varied than that of the class or out of context irrelevant matter, they come under 7 (a). The second subdivision is in the line with category 7 of FIAS where criticism, authority, self-praise on the part of the teacher and punishment, both corporal as well as verbal insults are given to the pupil. This is quite common in Indian schools, therefore, this activity on the part of the teacher has relevance in Indian situations. It has little relevance with Amidon-Hunter modified category system.

Category 8:— Student response :

This category, though has much in common with the same category of the other two systems, its scope in the RCEASIA is wider enough which leads to involvement of pupils in the classroom teaching functions It includes the various activities that are expected of the student in the classroom teaching-learning situation both in theoretical and practical subjects, science and humanities etc.

Category 9 : –Pupil-Initiation :

Slightly different from the corresponding category of FIAS and modified category system, this system gives more emphasis on the development of the child's higher mental processes, judgement, decision-making and creativity. It emphasizes not only the clarification of doubts but also students creative expressions, curiousity and inquisitiveness.

Category 10:—Silence :

This category has two subdivisions : (a) Purposive silence,that includes those activities that help and accelarate the teaching learing process. 10 (b) includes non - purposive silence and confusion on the part of the teacher due to lack of preparation and classwork or homework or school work. Here lack of proper descipline in the classroom is also indicated.

Encoding Process of Classroom Verbal Interaction

Encoding of classroom verbal behaviour of teachers through Regional College of Education Ajmer system of Interaction Analysis (RCEASIA) is similar to that of Flanders system of interaction Aualysis described earlier. This also provides encoding of verbal behaviours at every 3 seconds interval.

Decoding Process of Classroom Verbal Interaction

Interaction analysis includes the processes of encoding and decoding, The verbal interactions of the internees are encoded in the encoding sheet which should be transferred to the observation matrix in relation to the ten category system. The observation matrix has to be decoded for purpose of interpretation in terms of behaviour ratios and clockwise Flow Diagrams etc.

Flanders suggested three commonly used arithmatic procedures for comparing two or more matrices. The first one the millage matrix, is an elegant method where all the matrices are converted involving thousands of tallies at common base of 1000. The second one which is very convenient to use, is to convert all column's totals to percent of the matrix total and to calculate the Behaviour Ratios. The third one is used when there are two matrices and no normative expectations are required. The behaviour ratios have been developed for interpreting observation matrices of RCEASIA data on the pattern of Flanders. A comparative Chart showing the computational formulae for behaviour ratios for the two systems (FIAS AND RCEASIA) have been provided in appendix-3. The description follows :

Description of the Behaviour Ratios for RCEASIA

1. **Teacher Talk (TT) :**

It is defined as actions or activies undertaken by the teacher which encourage or restrict pupil participation that reflect the tendency of teacher talk.

2. Indirect Teacher Talk (ITT) :

It is defined as actions undertaken by the teacher which encourage or support students' participation. Accepting, clarifying, praising, encouraging, and developing the ideas, feelings and expressions of pupils will support pupil participation and activities.

3. Direct Teacher Talk (DTT) :

This concept refers to actions or activities undertaken by the teacher which restrict pupil participation. It includes expressing one's views through lectures, giving directions and criticism with the expectation of compliance of order.

4. Pupil Talk (PT) :

It is defined as the talk of pupils in response to the teacher or initiation of pupil, who asks the teacher to approve of him in order to assure his work. It includes satisfactory discussion among students. It is the percentage of student talk falling into categories 8 & 9.

5. Silence or Confussion (SC) :

This category is defined as an event not included in other categories. It is a period of silence or confusion in which communication can not be underastood by the observer, when it is difficult to ascertain who is talking.

6. Indirect to Direct Ratio (I/D) :

It is the ratio of indirect influence to the direct influence of the teacher in the classroom. Hence it is an index of complex teacher behaviour in the classroom.

7. Pupil-Initiation Ratio (PIR) :

It proposes to indicate what proportion of pupil talk has been judged by the observer to be an act of initiation. It is calculated by multiplying the frequency in category 9 by 100 and dividing by the sum total of all pupil talk.

8. Teacher Response Ratio (TRR) :

It is defined as a complex index which corresponds to teacher's tendency to react to the ideas and feelings of the pupil.

9. Teacher Question Ratio (TQR) :

TQR is an index representing the tendency of a teacher to use quetions when guiding the more content oriented part of the class discussion.

10. Content Cross Ratio (CCR) :

CCR represents those activities of the teacher which are related to his questions and lectures and indicates that the main focus of the teacher's activities has been on classroom discussions, questions and lectures on the content area, and that his attention to motivation and discipline are minimum.

11. Steady State Ratio (SSR) :

It reflects the tendency of teacher and pupil-talk to remain in the same category for periods longer than three seconds. The higher the ratio, the less rapid is the interchange between the teacher and the pupils on the average. SSR is determined by calculating the percentage of all tallies that lie within the 10 steady state cells.

12. Pupil Steady state Ratio (PSSR) :

PSSR is a sensitive index to the rapidity to the teacher pupil interchange, when pupil talk is average or above average.

13. Instantaneous Teacher Response Ratio (TRR 89)

It is defined as the the tendency of the teacher to praise or integrate pupil ideas and feelings into the classroom discussions, at the moment he stops talking.

14. Instantaeous Teacher Question Ratio (TQR 89) :

It is the tendency of the teacher to respond to pupil-talk with questions based on his own ideas compaired to his own tendency to lecture.

15. Vicious Circle (VC) :

It reflects the tendency of the teacher in giving direction and self-justication. It involves restrictive behaviour on the part of teachers as would make them authoritarion curbing the freedom and initiative of students.It is sensitive to the difficulties faced by the teacher when pupils are not complying satisfactorily or there are problems related to classroom discipline.

16. Purposive Silence Ratio (PSR) :

It is the ratio of purposive silence to the total silence occurred in the classroom. It thus provides an index of teacher's meaningful use of silence which may encourage students an opportunity to observe, judge and react in a desirable manner. This ratio was developed, especially for RCEASIA.

Interpretation of Observations Through RCEASIA

As mentioned earliar the processes of encoding and decoding are almost similar to those of Flanders system. The sequence of classroom events are recorded systematically on record sheets during teaching episode. These data are than transformed into a thirteen by thirteen matrix table following the usual procedures.

Ground rules Suggested by Flanders are also employed here. The same procedure is adopted for preparing the matrices and pooled matrices. Interpretations can be based on categories and behaviour ratios which may be computed as discussed above.

Qualitative analysis in terms of clockwise flow diagams and Box Flow diagrams is also possible on Flanders Pattern. Interaction models of critical teaching behaviour may also be located from clock wise flow diagram. The inter-observer and intra observer reliabilities may also be estimated through scott's formula.

Assumptions of Regional College of Education Ajmer System of Interaction Analysis (RCEASIA)

1. This system also assumes that verbal behaviour of a teacher is an adequate sample of his total behaviour which can be observed with higher reliability.

2. Teacher exerts a great deal of influence on the pupils behaviour. This is more relevant to classroom situation.

3. The classroom interactions can be better observed by an observer oriented in the subject matter of the class discussion. Since relevance can only be judged by a qualified person.

4. The system would provide data, more broad based as it includes separate categories for demonstrating activities and managerial activities.

5. Change in classroom behaviour through feed back is possible.

6. Teacher's classroom behaviour can be observed more specificlly and objectively by use of RCEASIA which is designed to catch the natural modes of behaviours.

Main Features of RCEASIA

The RCEASIA derives its name from the attempts made at Regional college of education Ajmer to modify Flanders System with a view to make it broad based and applicable to Indian conditions. In this system there are ten categories out of which three have two sections each. Special emphasis has been given to relevance of a particular type of classroom behaviour to be judged by an expert observer with reference to standard of particular class and desirability of certain classroom behaviours. Purposive silence has been recognised as a useful and necessary activity. This provides an opportunity to assess and develop managerial skills among teachers. There is provision for encoding convergent and divergent questions separately. The importance of demostrating activities has been recognised by way of incorporating a full fladged category to this effect. It also helps in specifically observing teachers attempts to motivate students. The study of Jayashree Panda (1980) has established its feedback value to be better than FIAS in Indian conditions. The usuability of the tool is also satisfactory. More scholars are working with this tool to establish its worth further.

Limitations of RCEASIA

1. There may be behaviours which might not be covered under the Categories of this tool. Since it is difficult to develop a category system inclusive of all kinds of classroom communication.
2. Non-verbal behaviour is not encoded through this system.
3. To interpret data is a combursome job and requires trained personnel.
4. Observation through this system requires a content oriented person.
5. As the focus of this tool has been the modification of teacher behaviour, more attention has been given to indirect/direct behaviour of the teacher and little attention has been given to pupil talk.
6. Although the system has inferential power, its potential as a resarch tool for wide application to various problems is yet to be explored.

Science Teacher Behaviour Inventory (STBI)

Development of science Teacher Behaviour I ventory (STBI) refers to an earliar attempt made by B. K. Sharma and N. Vaidya (1973) at Regional College of Education Ajmer. As evident from its name STBI focusses on class room behaviour of Science Teachers. This specialized tool accounts for both verbal and non verbal behaviours of teachers. It is a twenty category system. A copy of STBI has been provided in Appendix—6.

Categories of STBI

STBI is also based on Flanders model. There are Thirteen categories for teacher behaviour. Categories 4 (poses question), 5 (Teacher gives lecture), 11 (Teacher provoked anger/criticizes) and 12 (Teacher gives direction) are parallel to Flanders categories 4, 5, 7 and 6 respectively. categories 1 (Teacher utilizes students' response/accepts ideas/praises), 2 (Teacher handles/builds students responses) and 3 (Teacher summarizes/writes on B.Bd.) are meant for teacher's behaviour approving, encouraging and reconstructing pupil responses. The two categories; 9 (Teacher uses resource material) and 10 (Teacher shows models/demonstrates/experiments) are concerned with teacher's skill to use laboratory materials and his/her demonstration skills. Another three categories : 13 (Teacher admits faults), 14 (Teacher supervises), and 15 (Teacher pauses) are concerned with teacher's behariour pertaining to his / her objective and frank nature, supervisory role and purposive silence, some characteristics of science teachers making them more effective and resourceful. One very important category is 16 (Teacher provides opportunity to think/student's thinking which can be used to provide feed back to teachers and to make them aware of the importance of student's thinking in the teaching-learning process.

Five categories have been employed to encode students behaviour. Categories 7 (Student initiates) and 8 (Student gives response) are paerallel to the categories 9 and 8 of FIACS. Besides this three more student's behaviours which could not find place in Flanders system and in many other modified systems have been acknowledged by incorporating categories 6 (Student-student interaction) and 18 (Student exprrimenting).

The authors have visualized situations when either there is interruption by some external element or a non purposive activity might be going on. This idea has led to the inclusion of two categories : 19 (Interruption by external agency) and 20 (when no meaning ful activity is going on).

Science Teacher Behaviour Inventory (STBI) thus provides an acceptable method of analyzing class room interaction of science teachers. The tool has been used by sharma him self for his Ph. D. thesis and by many other scholars in the field as well.

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PART II

INTERACTION ANALYSIS : RESEARCH

RECENT TRENDS IN INTERACTION ANALYSIS RESEARCH IN INDIA

INTRODUCTION

Teacher Education in India is undergoing imperceptible metamorphosis. In depth research studies are being undertaken by research workers in education with a view to develop techniques that make the educational component trainable so as to improve over all effectiveness of teacher behaviour. The large number of studies carried out during the last two decades have made it more and more apparent that the effect achieved by a given way of behaving is precisely very specific to the teacher, the pupil and the situation. The number of universally effective behaviours, if there are any, is very small indeed. Focus of the research on teacher behaviour has, therefore, been to highlight systematic thinking on teaching process. The perspective has shifted from the emphasis on identification of specific behaviours putatively associated with poor or good teaching.

The spontaneous behaviour of a teacher is so complex and varied that an accurate description of it is most difficult to obtain. Attempts to develop scientific technique for recording, organising and analyzing the spontaneous class room behaviour have led to the systematic observation of teaching. The term Interaction analysis refers to any technique for studying the chain of classroom events in such a fashion that each event is taken into consideration. Interaction analysis is closely associated with the name of Flanders (1963) who developed the system originally as a part of research into teacher influence, pupil attitudes and achievements. It is particularly concerned with the influence pattern of the teacher

Most of the functions associated with teaching are performed by verbal communication, of course, non verbal communication does exist and is not unimportant. But non-verbal communication occurs less frequently than verbal communication and the two are highly correlated. Interaction analysis is mainly concerned only with verbal behaviour in the class-room assuming that the verbal behaviour of the teacher is an adequate sample of his total behaviour, that is, his statements are consistent with his non-verbal gestures. Last decade has witnessed a sharp increase in the number of studies undertaken on various aspects of teacher behaviour using inte-raction analysis with special reference to verbal behaviour of teachers.

Studies on non-verbal communication have yet to gain popularity. The author has attempted to trace the recent trends in Interaction analysis research with a view to review the research work done, pointing out gaps and to Identify needed research, which would certainly not be prescriptive as the ingenuity of researcher and Societal needs will influence research efforts.

OVERVIEW

In India, studies using systematic observation of class-room behaviour of teachers drew attention of researchers quite late. 1970 may be regarded as beginning of such studies. Centre of Advanced Study in Education (CASE) Baroda has been pioneer in the serious researches in this area

N.C.E.R.T. New Delhi, Regional College of Education Ajmer, Banglore University and Govt. Teachers Training College Jabalpur seem to occupy the status of stray research done in the area. Universities like Delhi, Agra, A.M.U. Aligarh, Allahabad, Jiwaji, Patna, Vishwa Bharti, Sambalpur, Kurukshetra, Nagpur and Sagar have contributed in the area of teacher behaviour but the trend of interaction analysis is still conspicuous by its absence. The present paper is based on 60 studies at Ph. D and M. Ed. levels and independent papers/projects summarized in Table. 3

DESIGN :

While considering the design of the studies conducted in the area, it may be stated that most of the studies are surveys employing correlational and correlational with inferential statistics. Experimental studies can be counted on one's fingure tips. The studies of Roy (1970), Jangira (1972), Pangotra (1972), Vasishtha (1976) and Panda (1980) have employed experimental designs. It is encouraging to note that a trenp of undertaking well controlled experimental studies, field studies and laboratory studies seems to have started in the country. Such studies would help in developing instructional theory of teaching.

METHODOLOGY

Most of the researches conducted in this area are descriptive and survey type, which aim at describing teaching. The other category attempts to establish relationship between different variables in teaching and teacher behaviour. Experimental studies by their very nature face difficulty of proper controlling of variables and minimization of errors. One to three week field experiments and laboratory experiments for the same duration seem to be a desirable trend for future studies.

Flanders Interaction Analysis category system (FIACS) seems to be dominating a maximum number of research studies in the area. Its use has been two fold: firstly as a tool to explore verbal behaviour of teachers and secondly as a feedback device A number of tools are available in Mirrors of Behaviour (Simon add Boyer, 1970). Indian researchers have also tried to develop tools of this type. Tools developed by Jangira (1971), Sharma (1973), Verma and Ansari (1975), Deva (1978), Vasishtha and Agarwal (1979) are worth mentioning Development of tools for interaction analysis with provision for cognitive and psychomotor behaviours and also for non-verbal behaviours appear yet to be done. New Systems can, therefore, be developed and tried out.

'High inference' level variables may produce encouraging results as against the 'low inference' level variables generally used in studies (Rosenshine, 1971). Need to study both 'low inference', and 'high inference' variables simultaneously appears to be evident. Emphasis on multivariate analysis and Factor Analysis may reflect in future.

Classification of Studies :

The studies have been broadly classified into four groups according to the nature of work done. They are (i) Presage Process Studies (ii) Process Studies (iii) Process-Product studies and (iv) Presage-Process-Product Studies. Year and level wise distribution of these studies has been presented in Table-3.

TABLE—3

Year and Level wise Distribution of Studies

S.No.	Nature of Studies	Level of Studies Ph.D.	M.Ed.	Project/Papers	Total
1.	Presage-Process	07	9	—	16
2.	Process	07	16	05	28
3.	Process-Product	10	03	01	14
4.	Presage-Process—Product	02	—	—	02
	Total	26	28	06	60

It may be noted from Table-3, that maximum number of studies figure in the process dimension. The number of studies at Ph. D. level with reference to Presage-Process, Process and Process-Product has little variation and only a few studies have been designed on Presage-Process-Product dimensions. At M. Ed. level much attention seems to have been given to Process Studies. The above mentioned studies are discussed below category wise :

1) Presage-Process Studies :

Studies under this title attempt to relate presage variables with process variables. The presage variables are aptitude, interest, creativity, personality, self concept, inter-personal relationship, Academic grades, adjustment etc. And amongst the process variables, classroom verbal behaviour patterns, classroom performance ratings, teaching skill etc. have been studied. Quraishi (1972) (95) attempted to predict the dimension of teacher behaviour and observed that verbal behaviour was related in a small measure

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to their personality and attitudes. Sociable trait was found to be the best predictor of students initiation Direct and indirect teachers did not differ significantly from each other on seven personality traits implying that personality did not affect teacher behaviour Patel (1974) (90) reported favourable effect of indirect influence on motivation, classroom organization, students attitude towards the teacher and personal anxiety of pupils. Teacher's classroom behaviour could not effect the pupils attitude towards rewards and punishment and attitude towards School. Smt. S. K. Singh (1974, (112) attempted to investigate the relationship between attitude towards teaching and classroom verbal behaviour of student teachers and reported significant relationship between teaching attitude and verbal interaction of teachers. The study indicated clear relationships of indirectness, sustained acceptance, indirect influence, questions, praise and flexibility with teaching a titude and no relationship between teacher—talk and attitude towards teaching. Mathew George (1976) (51), Singh (1978) (113) and Baranwal (1978 (10) studied the relationship between classroom verbal behaviour of teacher with their creativity. The studies concluded that verbal creativity did not encourage student's participation but teachers with high verbal creativity seemed to react to the ideas and feelings of students. Non-verbal creativity helped teachers to develop democratic attitude and sincerity amongst them. Positive correlation between creative teacher personality and teacher talk and negative correlation with vicious circle were reported.

Mehta (1976) (73) found no significant relationships between the age and sex with verbal behaviour patterns of teachers. qualifications of teachers were reported to be significantly correlated with teacher question ratio. Recency of training and experience of teaching and teachers' perceptions of students were also not related with class room communication of teachers Shashi Kala (1978) (114) in an attempt to establish socio-psychological correlates of teacher behaviour reported no significant difference in teacher behaviour under the six different type of climates. Age was found to be positively correlated to I/D (indirect to direct ratio) and T Q.R. (teacher question ratio) and negatively to C.C.R. (Content Cross Ratio). Socio-Economic status and modernity were not related to any of the teacher behaviour indices.

Amongst M. Ed. level studies, Vijendra (1972), Sharma H. S. (197:) (115) and Pachauri Arlesh (1974) (91) attempted to establish relationship of teacher behaviour with teaching aptitude, Academic Achievement and Adjustment patterns respectively and reported significant relationships with various components of teacher behaviour. Academic Achievement was considered as a predictor of teacher behaviour. Goel S. (1973) (52) observed significant relationship between teacher's facutal knowledge of teaching practice and their classroom verbal interactions. Bhargava (1976) (9) explored the influence of certain personality variable on class room interaction of teacher trainees. Teachers low on personality variable used maximum teacher talk and teachers high on personality variables sought more students' participation. Saran (1979) (106) compared the self concept, classroom performance ond verbal behaviour (as observed through VICS) of Science student teachers of five types namely Trained Regular Teachers, Summer-School-Cum-Correspondance Course student teachers, One Year B. Ed. and Four Year B. Sc. B. Ed. integrated course student teachers, and student teachers of Individually accelerated learning project. The study concluded that the Four Year integrated course was superior than others in many respects. The individually accelerated learning project was also an worthwhile experiment.

Jadaun. S R. S. (1982) (59A) studied the Personality Correlates of teacher behaviour taking pre-service Science student teachers and using Cattles' 16 PF and the Regional College of Education Ajmer System of Interaction Analysis (RCEASIA). It was reported that Science teachers with high anxiety level were found to use more teacher talk categories, restricting students freedom of action, confining themselves with the delivery of content with less rapidity of interchange with pupils, making judicious use of silence component. Thus anxiety was found to reduce the teachers' tendency to encourage pupils' participation through proper use of questions and responding to pupil talk. The study also indicated that Extrovert Science Teachers were more indirect and the introvert teachers were found to use more teacher talk, reacting to ideas and feelings of pupils and permitting only the purposive silence,

The study also reported that alertpoise teachers were found to possess tendencies of putting questions when guiding more content oriented part of the class discussion, answering pupils querries with own ideas and thoughts due to their enterprising, resilient personality, on the contrary teachers with tender-minded emotionality were found to restrict students' participation by imposing more and more teacher-talk. The study also concluded that more independence in teachers personality made them more indirect and student loving. Independence appeared to contribute positively towards teachers' active role, skillful questioning and attending to pupils encouragement and approval of pupil activities. Moderate score on factor IV of 16 PF (subdued ness V/S Independence) were found to result optimal teacher effectiveness.

Sharma, A K. (1972)(107A) attempted to study the relationship between attitude towards teaching and class-room verbal interaction of pre service commerce teachers using RCEASIA. The study revealed significantly positive relationships of attitude towards teaching with Direct Teacher Talk (DTT) and Content Cross Ratio (CCR) besides significantly negative relationships with Teacher Talk (TT), Silence Confusion (SC) and Steady State Ratio (SSR) and negative relationship with Teacher Response Ratio (TRR), Teacher Question Ratio (TQR) and Purposive Silenee Ratio (PSR) in case of Book-keeping teachers.

The Commercial Practice student teachers' attitude towards teaching was found to be positively correlated with Teacher Talk (TT), Direct Teacher Talk (DTT), Content Cross Ratio (CCR), Steady State Ratio (SSR), Pupil Steady State Ratio (PSSR) Instantaneous Teacher Question Ratio (TQR 89) and purposive Silence Ratio (PSR) and negatively correlated with Indirect Teachers Talk (ITT), Pupil Talk (PT), Indirect-Direct Ratio (I/D), Teacher Question Ratio (TQR) and Instataneous Teacher Response Ratio (TRR 89). The flow patterns of verbal blehaviour of Book-keeping and Commercial Practice teachers were almost similar.

High and Low attitude Commerce teachers were found to differ significantly with respect to Direct Teacher Talk (DTT), Content Cross Ratio (CCR), Steady State Ratio (SSR), Instantaneous Teacher Question Ratio (TQR 89), on positive side and in respect of Pupil Talk (PT), Indirect-Direct Ratio (I/D), Teacher Response Ratio (TRR), Teacher Question Ratio (TQR) and Vicious Circle (VC) on negativa side.

ii) Process-Studies:

Studies classified into this group are those, which emphasize the interactive process of class room communication. Three major types of such studies may be visualized. Firstly, the exploratory studies aimed at identifying patterns of classroom verbal behaviour of teachers classified as Effective-Ineffective, Extrovert Introvert, Science-Arts etc Secondly, the feedback studies mainly comprising of experimental field studies designed to modify teacher behaviour in the predetermined direction. Thirdly, the studies aimed at developing tools of systematic observation of class room behaviour with different biases.

In the first category of studies of this type Santhanam (1972) (105) sought to study the pattern of teacher behaviour in relation to age, recency of training, experience, Sex, marital status and subject matter. It was concluded that age, recency of training and experience did not appear to effect teacher's indirect influence. Male and unmarried teachers were found to be more indirect as compared to female and married teachers. Significantly different patterns were noticed for teachers of different subjects. Maheshwari (1976) (74) Compared The verbal behaviourpatterns of effective and ineffective teachers and noticed significant points of contrast between the two. Effective teachers involved more indirect influence, students initiation and teacher response ratio, used more 'accepts feeling' 'using students ideas', 'question', 'students initiation.' The effective teachers used more creative teaching models. Nayar (1976) (77) studied cognitive interactions in class room instruction and reported that nearly thirty three percent time was used in classification, eleven percent of time was used in explanation, drawing was conspicuous in biological science than in physical sciences, oral presentation took more than half time in social sciences and least in mathematics. Teachers did not exploit higher level of interaction in content matter though that was potent source of variation in cognitive interactions. Sushma Goel (1978) (53) compared the flow patterns of extrovert and introvert teachers and reported that extrovert teachers seemed to have greater interchange of classroom events than introvert teachers. Extrovert teachers had all the seven models of critical teaching behaviour while introvert teachers had only first four models with respect to FIACS.

Rastogi (1972) (97) has conducted a research study taking content variable and observed that there were significant differences among various School subject teachers with regard to direct and indirect influence. Meena (1973)(75) ond Chaturvedi (1974) (26) attempted to explore patterns of verbal teacher behaviour through Ober's techniques of Reciprocal categories and Equivalent Talk Categories respectively. Meena observed almost identical behaviour patterns of English and Hindi language teachers while Chaturvedi reported similar findings for Histry and Geogrophy teachers. Dixit (1973)(32) observed that sex factor was found to be significant in relation to teacher behaviour. Anil Bhartiya (1974) (11) also compared the verbal behaviours patterns of extrovert and introvert teachers. Gupta V. (1975) visualized verbal behaviour patterns with reference to academic grades and classroom performance and found that academic grades did not influence indirectness of the teachers while classroom performance of indirect teachers was considered to be better than those of direct teachers.

Somvir (1975) (116) reported that criteria of teacher effectiveness was significantly related to indirect influence, pupil talk, initiation, teacher response ratio, teacher question ratio and instantaneous teacher question and response ratios. Teacher talk was found to be independent to teacher effectiverss. Satish Kumar Singh (1975) (118) conducted a study on the analysis of verbal behaviour of primary and secondary teachers. He observed that there was no significant difference in indirect influence, direct influence, teacher talk, content cross ratio, steady state ratio, pupil steady state ratio of primary and secondary teachers. It was noticed that Primary teachers had more pupil talk and teacher response as compared to secondary teachers. Kiran Bala (1975) (64) comparing R.CE. inservice teachers and teacher trainees at the initial and final stages of internship in teaching reported higher constructive integration pattern and lower vicious behaviour at the final stages. Srivastava (1975) (121) explored the verbal behaviour patterns of trained and untrained biology teachers and noticed that trained teachers spend little time in giving directions and criticisms as compared to their untrained counterparts. Gupta (1976) (50) comparing class room teaching behaviour of science teacher trainees exposed to Micro teaching and conventional training through a sixteen category system reported significant differences in the use of Categories 4(Asks questions), 5(Lecturing, and 7(criticising and justifying authority). Also significant difference in teaching skills of reinforcement and probing questions and insignificant diference in the skill of stimulus variation were recorded.

Purohit S.K. (1982) (94A) Conducted an ex-post facto study of the verbal behaviour and some characteristics of effective and ineffective language teachers and reported that effective Hindi teachers were found to be more indirect in their classroom teaching. Tendencies of approving pupil actions, praising pupils, using and integating pupil ideas into class discussion, putting more relevant puestions, faithfully recognising the existence and participation of pupils, providin: maximum possible democratic atmosphere conducive to learning were predominent in comparison to their ineffective counterparts. Effective teachers seemningly did not believe much in demonstration but on students' practice., It was also reported that effective and ineffective Hindi teachers did not differ significantly in their attitude towards teaching, social adjustment and self perceptions. Flexible interactions were recorded in the verbal behaviour of effective Hindi teachers. This study also employed RCEASIA.

The second category of Process studies presents experimental field studies. Roy B (1970)(86) attempted to compare four feedback strategies. The findings reveal that in the four strategies percentage of improvement was fairly high, some teachers, however, did not change at all. The teachers who cared for likes or dislikes of pupils and who introspected and retrospected the teaching situation, had better chances of of being successful in their profession. Pareek and Rao (1970,1971) (85-86) attempted two different studies: In one they explored the verbal behaviour patterns of class V teachers of Delhi, where they found that the main teacher talk category was 'Lecturing' and main pupil talk category was 'pupil response'. In another study on behaviour modification of teachers through interaction analysis for ten days they found that feedback induced in them more of the indirect patterns of interaction i. e. more of praise, encouragemet and accepting and using pupil ideas.

Pangotra (1972) (83) attempted to investigate through a pre-test post-test design whether interaction analysis feedback provided by different sources exhibit modificatiah and improvement of teaching behaviour, and if so, to what extent. It was concluded that teachers of treatment group praised and encouraged pupil ideas more than control group teachers. They accepted, clarified, developed, compared, summarized ideas suggested by pupils more than control group teachers. Treatment group teachers used lesser directions and elicited more pupil initiated talk. Singh L. P. (1974) (111) compared the effectiveness of micro teaching feed-back and interaction analysis feedback through an exprimental study and reported that the verbal behaviour of student teachers exposed to micro-teaching and interaction analysis feedback gained more as compared to traditionally taught student teachers. Moreover micro teaching feed back was proved to be better than interaction analysis feedback. Vasishtha *(1976) (123)* attempted to study the change in some characteristics and verbal behaviour of secondary science and mathematics teachers through training in verval interaction technique. The study was conducted through Groups within Treatment Design. The characteristics taken up were the attitude towards teaching self concept and class room performance. Verbal behaviour was studied at five levels, namely, ten interaction categories (FIACS), fifteen behaviour ratios, ten interaction variables, clockwise flow diagrams and boxflow diagrams. The findings reveal that the training in Flanders verbal interaction technique contributed significantly to the attitude towards teaching, self perception and classroom performance of science student teachers. Teachers trained in FIACS made more use of interaction categories of acceptance of students' feelings, praise, accepting pupil ideas, pupil initiation and less use of categaries of Lecturing and giving directions. Student teachers trained in FIACS become more indirect in dealing with students. Significant gains in behaviour ratios of Indirect Teacher Talk(ITT), Pupil Talk(PT), Indirect-Direct Ratio (I/D), Pupil Initiation Ratio (PIR), Teacher Response Ratio (TRR), Teacher Question Ratio (TQR), and Instantaneous Teacher

Response Ratio (TRR 89). The interaction variables of indirectness, indirect influence, praise and flexibility were found to have significant gains in the verbal behaviour of treatment group Interaction variables of restrictiveness restrictive feed back suffered significant losses for experimental group. The flow patterns ot FIACS trained teachers indicated all the seven models of critical teaching behaviour. Experimental group teachers developed a tendency to react to the ideas and feelings of students and to follow silence confusion by direction or lecture. As a whole interaction analysis feedback was found to be useful in modifying teacher behaviour in desired direction.

Vasishtha (1976) (125) conducted another study to study the effect of interaction analysis feedback on B.Ed. Arts students and coucluded that their training in verbal interaction technique effected positive changes in self perception of treatment group teachers. Adequate increase in indirectness, tendency to react to ideas and feelings of pupils, pupil creative enquiry, teacher's tendency to respond to pupil talk and tendency of rapid interchange were positively effected by interaction analysis feedback.

Amongst M. Ed. level studies Anjana Kumari (1976) (2), Ramesh Kumar (1977) and Jayashree Panda (1980)(92) studied effect of Micro teaching, simulated Micro teaching and interaction analysis feedback respectively on the verbal behaviour of student teachers. Anjana Kumari reported that supervisory feedback significantly contributed towards general teaching competence of student teachers and peer group feed back was found to be ineffective. Ramesh Kumar (1977) conducted an experiment in the modification of teacher behaviour through simulated Micro teaching technique and observed a shift from direct to indirect behaviour and the student teachers of experiemental group developed a tendency to encourage students participation and to follow it by praise

Panda (1980) (92) compared the effectiveness of interaction analysis feedback by FIACS and RCEASIA (Regional College of Education Ajmer System of Interaction Analysis) through a pretest-post-test design on Science student teachers and found that both FIACS and RCEASIA were at par with reference to gain in utilizing pupil ideas and enhancement of pupil participation. RCEASIA feedback generated more indirect behaviour as compared to FIACS feedback. RCEASIA feedback was also useful in directing student teachers for asking open end questions, undertaking managerial activities and in presenting more balanced class-room behaviour. Flow patterns of RCEASIA trained student teachers' verbal behaviour demonstrated more models of critical teaching behaviours. Gain in teacher's attitude and class room performance were more in RCEASIA treatment group teachers.

The third category of process studies includes tool construction studies. Sharma (1973) developed Science Teacher Behaviour Inventory. It can observe some of the nonverbal behaviours besides verbal behaviour. Vasishtha and Agrawal (1979) developed Regional College of Education Ajmer System of Interaction Analysis which presents a modification of FIACS. It is content oriented, relevance based and focussed towards realistic and precise analysis of verbal behaviour of teachers of various disciplines. These two and some other attempts by Indian researchers have been referred to in Part I of this book.

(iii) Process Product Stdies :

Studies falling under this category have attempted tofind out the effect of the process treatment on the product variables.

The study conducted by Govt. College of Education, Jabalpur (1971) revealed that there was a trend, though not significant, aiming pupils to like teachers who used indirect influence and to dislike direct influence. Jangira (1972) (60) on the basis of an experimental study reported that pupils taught by teachers who were trained to be indirect, secured higher on adjustment to school, teacher and general adjustment depending on class room trust than pupils taught by teachers trained conventionally.

Sharma S. (1972) (109) and Padma (1976) (93) studied the effect of different teaching patterns on the cognitive attainment of pupils. Sharma (1972) reported that a teaching pattern involving narrow questions was more effective than other patterns in attaining knowledg and comprehension objectives. Both investigators could not identify teaching patterns superior to others in attaining application objectives Such research studies are fundamental to the research in teaching. Although such studies pose difficulty in conducting them but need to be undertaken.

Study conducted by Lulla (1974) (66) revealed that indirect teacher behaviour could raise the interaction potential and provided congenial climate to the teacher. The students taught by teachers trained in indirect behaviour scored higher to pupils of those not so trained. Raijiwala (1976)(99) also conducted a similar study and reported that the training in FIACS modified the teachers' indirect behaviour positively and also effected pupils adjustment, classroom trust, and initiative level positively. Significant gains were recorded in science achievement of the pupils of experimental study and found that limited training in interaction analysis did not yield significant modification in the behaviour of subjects.

Additional training in interaction analysis was found to contribute significantly towards asking divergent questions, lecturing and students response. The study indicated that asking significantly more of divergent and evaluative questions did not result in significant difference in Mean achievement at knowledge level but resulted in significant ·05 level) difference in mean achievement at understanding and Application levels. Shaida (1976) (112) also studied the effect of questioning and feedback on pupil attainment and concluded that the pattern of narrow questions and feedback produced significantly higher mean for development and retention of application but did not influence total attainment. Desai (1977) (31) reported that training in FIACS modified teacher's indirect behaviour positively. The training and feedback affected the academic achievement of pupils in mother tongue positively. The training and feedback also affected pupils class room trust, initiative and adjustment towards home, school, peers and teachers positively.

Pavansam (1977) (94) also conducted a similar study and concluded that Teachers trained in Interaction Analysis feedback talked less, encouraged more pupil participation, and had more pupil initiation. The interaction patterns acquired during training were sustained for more then twenty weeks after the completion of training. Students of experimental group teachers scored high in all tests as compared to their counterparts in control group. Pillay's (1978) study revealed that treatment of creative teaching method did not produce differntial effect upon general creative thinking and on its subparts such as seeing problems, unusual uses and consequences on eighth graders' creative thinking in geography. Among the five operations of the st intellect : cognition, memory, divergent production, c production and evaluation, the convergent produ improved by Creative Teaching Method. Out of thir abilities, seven abilities were significantly developed b teaching method. On the contrary the traditional me luenced memory for word meanings only.

Studying the relationship between teacher's verl viour and pupil achievement, Agarwal (1973)(1) repo terminal structuring utterance with one question foll thanks and praise to be highly and positively correla residual achievement. Also lecturing, naming child to simpler affirmative and negative comments and revision strated highly negative correlation with residual achie Yadav (1973)(134) used modified FIACS and found cally significant difference between programmed and grammed teachers in their behaviour patterns. The achi of the pupils of programmed teachers was observ higher to their counterparts. Saxena (1975)(107) pre comparative study ef verbal teaching behaviour patt student achievement at knowledge, understanding and tion levels. He reported significant differences in th achievement of programmed and non-programmed te

(iv) Presage-Process-Product Studies :

Only two Ph. D. level studies fall in this Such studies require more time in completion. T gation by Sharma (1971) (117) aimed at studyin tionship between characteristics possessed by te teacher effectiveness reported high positive correlati teaching aptitude and indirect influence and negati tion with teacher talk. The combination of fiv

i. e. teaching aptitude, acadamic grades, socio-economic status, teaching experience and age in order of their arrangement appeared to be sound predictors of teacher effectiveness.

Malhotra (1976) found science teachers with bachelors degree, low teaching experience to be more indirect as compared to their master's degree holder, more experienced arts counter-parts. Sex variable was not having differentiability. Teaching attitude had positive relationship with indirectness. Indirect teachers had higher self concepts, were rated higher by their students and peers. Factor analysis resulted into nine various factors, namely, reinforcing pupil participation, peers disapproval of stable behaviour, teacher attitudes, adaptability, teacher simulated pupil participation, students linking for indirectness, principal approved subject Informative behaviour, perceived teacher behaviour and silence-confusion.

NEEDED RESEARCH

In the studies reviewed above, it can be noticed that presage—process and process studies conducted at Ph D. level are equal and process-product studies are nearly fifty percent more to each. This is a good trend since it will help in establishing that what type of process results in what type of products. The sole work done in process-product studies is at CASE, Baroda. Regional College of Education, Ajmer represents M. Ed. level research in this direction. There is need of conducting more research studies of process-product type in different parts of the country simultaneously. Another point of concern is the study of effects of different teaching patterns on cognitive attainment of pupils, where serious concerted efforts are required.

Presage-Process-Product studies are very few in number, since these present comprehensive relationship between presage, process and product variables. Need for such studies is self evident.

Process studies should now be directed towards development of observational systems based on cognitive and psychomotor aspects. Efforts should be made to develop set of tools measuring variety of teacher behaviour which would facilitate arriving at results having higher generalizability. It should be followed by experimental studies to ascertain feedback value of these systems in terms of teacher-behaviour and pupils achievement.

Presage—process studies may be undertaken by taking 'low inference' and 'high inference' variables as well.

Attempts should be made to study non-verbal behaviour of teachers as well. Tools on the patterns of Galloway (1968) need to be developed and tried out.

As an out come of First National seminar on Teaching (1970), Cooperative Project on Productive Teaching (COPPT) was undertaken aiming at finding out the classroom behaviour norms of Indian Teachers. The findings of this project have not been published so far. This gives rise to the conclusion that fresh attempts should be made to develop norms for teacher behaviour with respect to various school subjects.

The researches conducted in the process category of teacher behaviour have indicated positive changes in the verbal behaviour of pre-service teachers. The effect of feedback strategies have been found to last upto twenty weeks after the completion of training. It is generally found that teachers on job do not exhibit patterns of teacher behaviour as envisaged and developed during training. It is a challenging problem for researchers in the field of interaction analysis to inculcate an attitude of life long self improvement amongst pre-service teachers and sustenance of verbal behaviour patterns developed during training.

Institution wise survey clearly indicates that interaction analysis research need to be popular at centres other than CASE, Baroda or Meerut Uhiversity. Regional College of Education Ajmer has contributed M. Ed. level research in the area so far. It looks forward for Ph. D. level research and projects of national importance. N. C. E. R. T. and other Regional Colleges of Education are Centres towards which one can look up for large scale undertakings.

Trend for undertaking research studies with coupled strategies have also begun which has yet go a long way.

The studies in this area have confined to School level only (with special reference to secondary level). More research studies are needed at Elementary level and research trend for undertaking such studies at college level has yet to begin.

Readers may come across wide gaps in research on teaching. Inadequacies in design and methodoolgy have also been revealed in the overview.

However, it is encouraging to note that more and more researchers are attracted towards interaction analysis research. One can look forward for quantitative expansion and qualitative improvement of interaction analysis research in India.

PART III

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PART IV

APPENDIX

APPENDIX -- I

Flanders Interaction Analysis Categories (F I A C)

Teacher Talk	Response	1. Accepts feeling—Accepts and clarifies an attitude or the feeling tone of a pupil in a non threatning manner. Feelings may be positive or negative. Predicting feelings are included. 2. Praises or Encourages—Praises or encourages pupil action or behaviour. Jokes that release tension, but no at the expense of another individual: nodding head, or saying, 'Um hm ?" or "go on" are included. 3. Accepts or uses ideas of pupils--Clarifying, building or developing ideas suggested by a pupil. Teacher extensions of pupil ideas are included but as the teacher brings more of his own ideas into play, shift to category five.
		4. Asks questions :--Asking a question about content or procedure based on teacher ideas. with the intent that thepupil will answer.

Teacher Talk	Initiation	5. Lecturing--Giving facts or opinions about content or procedures; expressing his own ideas, giving his own explanation or citing an authority other than a pupil.
		6. Giving directions--Directions commands or orders to which pupil is expected to comply.
		7. Criticising or justifying authority--Statements intended to change pupil behaviour from non acceptable to acceptable pattern : bawling some one out, stating why the teacher is doing, what he is doing, extreme self reference.
Pupil Talk	Response	8. Pupil Talk-response--Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structures the situation. Freedom to express own ideas is limited.
	Initiation	9. Pupil Talk--Initiation--Talk by pupils which they initiate--Expressing own ideas; initiating a new topic : Freedom to develop opinions and a line of thought, like asking thoughtful questions : going beyond the existing structure.

Silence	10.	Silence or Confusion--Pauses; short periods of silence and confusion in which communication can not be understood by the observer.

○

There is no scale implied by these numbers. Each number is classificatory; it designates a particular kind of communication event To write these numbers down during observation is to enumerate not to Jugde a position on the scale.

APPENDIX 2(i)

Record Sheet for encoding verbal interaction

Name of the candidate..

Subject......................................

Topic..

Date

Roll No................................

Class.....................................

Time of Observation........Minutes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Remarks

Observer

APPENDIX 2 (ii)

OBSERVATION MATRIX

CODE NO. TABLE NO...

Name of Teacher Date.
Teaching Subject Time
Name of Practice School

CLASSIFICATION		CAT	1	2	3	4	5	6	7	8	9	10	Total
TEACHER TALK	INDIRECT TALK	1											
		2		E									
		3											
		4				CC				I			
	DIRECT TALK	5											
		6						F					
		7											
STUDENT TALK		8		G				H		J			
		9											
SILENCE		10											
		Total											
		%											

A INDIRECT TEACHER TALK	B DIRECT TEACHER TALK	STUDENT TALK	SILENCE
TOTAL TEACHER TALK (A + B)		C	D

APPENDIX—3

Computation Formula of Behaviour Ratio from Observation Matrix

S,No.	Behaviour Ratio	Symbol	FIAS System	RCEASIA System
1.	Teacher Talk	TT	$\frac{1+2+3+4+5+6+7}{N}\times 100$	$\frac{1+2+3a+3b+4+5+6+7a+7b}{N}\times 100$
2.	Indirect Teacher Talk	ITT	$\frac{1+2+3+4}{N}\times 100$	$\frac{1+2+3a+3b}{N}\times 100$
3.	Direct Teacher Talk	DTT	$\frac{5+6+7}{N}\times 100$	$\frac{4+5+6+7a+7b}{N}\times 100$
4.	Pupil Talk	PT	$\frac{8+9}{N}\times 100$	$\frac{8+9}{N}\times 100$

5.	Silence/Confusion	SC	$\frac{10}{N} \times 100$	$\frac{10a+10b}{N} \times 100$
6.	Indirect to Direct Ratio	(I/D) Ratio	$\frac{1+2+3+4}{5+6+7}$	$\frac{1+2+3a+3b}{4+5+6+7a+7b}$
7.	Small Indirect to Direct Ratio	(i/d Ratio)	$\frac{1+2+3}{6+7}$	$\frac{1+2}{6+7}$
8.	Pupil Initiation Ratio	PIR	$\frac{9}{8+9} \times 100$	$\frac{9}{8+9} \times 100$
9.	Teacher Respone Ratio	TRR	$\frac{1+2+3}{1+2+3+6+7} \times 100$	$\frac{1+2}{1+2+6+7a+7b} \times 100$
10.	Teacher Question Ratio	TQR	$\frac{4}{4+5} \times 100$	$\frac{3a+3b}{3a+3b+4+5} \times 100$
11.	Content Cross Ratio	CCR	$\frac{4+5}{N} \times 100$	$\frac{3+4+5}{N} \times 100$

12.	Steady State Ratio	SSR	$\frac{(1--1)+(2--2)+(3--3)+(4--4)+(5--5)+(6--6)+(7--7)+(8--8)+(9--9)+(10--10)}{N}\times 100$	$\frac{(1--1)+(2--2)+(3a--3a)+(3b--3b)+(4--4)+(5--5)+(6--6)+(7a--7b)+(8--8)+(9--9)+(10a--10a)+(10b--10b)}{N}\times 100$
13.	Pupil Steady State Ratio	PSSR	$\frac{(8--8)+(9--9)}{8+9}\times 100$	$\frac{(8--8)+(9--9)}{8+9}\times 100$
14.	Instantaneous Teacher Response	TRR89	$\frac{(8--1)+(8--2)+(8--3)+(9--1)+(9--2)+(9--3)}{(8--1)\quad(8--2)+(8--3)+(8--6)+(8--7)+(9--\text{[illegible]})+(9--2)+(9--3)+(9--6)+(9--7)}\times 100$	$\frac{(8--1)+(8--2)+(9--1)+(9--2)}{(8--1)+(8--2)+(8--6)+(8--7a)+(8--7b)+(9--1)+(9--2)+(9--6)+(9--7a)+(9--7b)}\times 100$
15.	Instantaneous Teacher Question Ratio	TQR89	$\frac{(8--4)+(9--4)}{(8--4)+(8--5)+(9--4)+9--5))}\times 100$	$\frac{(8--3a)+(8--3b)+(9--3a)+(9--3b)}{(8--3a)+(8--3b)+(8--4)+(8--5)+(9--3a)+(9--3b)+(9--4)+(9--5)}\times 100$

16.	Vicious Circle	VC	$\frac{(6--6)+(6-7)+(7--6)+(7--7)}{N} \times 100$	$\frac{(6--6)+(6--7a)+(6--7b)+(7a--6)+(7b--6)+(7a--7a)+(7b--7b)+(7a--7b)+(7b--7a)}{N} \times 100$
17.	Purposive Silence Ratio	PSR		$\frac{10a}{10a+10b} \times 100$

APPENDIX 4

Symbols and Formula for Interaction Variables

S. No. 1	Behaviour Ratios 2	Symbol 3	Formula 4
1.	Indirectness	i/i+d	$\frac{1+2+3}{1+2+3+6+7} \times 100$
2.	Sustained Acceptance	(3—3) Cell	$\frac{(3-3)}{3} \times 100$
3.	Indirectness	Columm 1, 2, 3, 4	$\frac{(1+2+3+4)}{N} \times 100$
4.	Questions	Columm 4	$\frac{4}{N} \times 100$

1	2	3	4
5.	Teacher Talk	Columm 1 to 7	$\frac{(1+2+3+4+5+6+7)}{N} \times 100$
6.	Restrictiveness	Columm 6, 7	$\frac{6+7}{N} \times 100$
7.	Restrictive Feedback	(8—6)+(8—7)+(9—6)+ (9—7) Cells	$\frac{(8-6)+(8-7)+(9-6)+(9-7)}{6+7} \times 100$
8.	Negative Authority	(6—7)+(7—6) Cells	$\frac{(6-7)+(7-6)}{6+7} \times 100$
9.	Praise	Columm 2	$\frac{2}{N} \times 100$
10.	Flexibility	(High i/d—Low i/d)	(High i/d — Low i/d)

APPENDIX–5

Regional College of **Education** *Ajmer* **System** *of Interaction Analysis (RCEASIS)*

Category	Number		Description of Verbal Behaviour
TEACHER	INDIRCT INFLUENCE	RESPONSE INITIATION	(1) **Approve Pupil Action :** Agrees to pupil's action or behaviour : shows satisfaction; amicable acceptance of student's feeling; uses extra verbal cues and positive non-vebal reinforcers, e.g. saying hum-hum, O.K. yes, good, right, correct, go ahead and nodding head, etc.
			(2) **Utilizes Pupil Ideas :** Accepts, clarifies, rectifies and develops pupil ideas leading to congruous solutions, extensions of pupil ideas/responses.

TALK	DIRECT INFLUENCE	INITIATION	(3a) **Asks close-end question :** Asks drill questions whose response is quite predictable; (It) includes memory and comprehension level questions focussed on relevant content.
			(3b) **Asks open-end questions:** Asks thought-provoking questions or questions which call for unpredictable responses; (It) includes application and higher mental order Q.
			(4) **Demonstrating Aetivities :** Shows demostration; performs experimentation; uses audio-visual aids; model reading and recitation; dictation for improving language skills.
			(5) **Lecturing :** Giving facts or opinins about content or procedures; expressing his own ideas; giving explanation, narration, description, exposition, verbal

illustration; dictation notes; black-board writing and sketch work; reheterical Q.

(6) **Managerial Activities** : Directions, commands, orders, requests with the intention to promote desirable behaviour in the class room and to create an atmosphere conductive to learning.

(7) **Extra relevant and Irrelevant activities** : Any activity which is not in consonance with objectives of the lessons may be :

(7a) **Curricular** : Giving irrelevant or wrong information or informations beyond the score of the class or out or context questioning,

(7b) **Non-curricular** : Criticising or justifying authority, includes teacher's reprove, extreme self-reference and corporal punishment etc.

PUPIL	Response	(8) Student-Response : Talk by pupils in response to teacher, includes seeking clarification by students;. helping teacher in setting experiments; imitative reading and taking downnotes and doing class work.
TALK	Initiation	(9) Student-initiation : Students' creative expression (may be questions or statements), : includes higher order activity of students involving original thinking and noval ideas (prediction, inferences,-evaluation; etc.)
Silence		(10) Silence : (10a) Purposive silence:—Absence of verbalization utilized to promote planned sequence pauses or short periods of silence; include desirable classroom activities, e g; silent reading, settingup expriments or supervision of the class. (10b) Non-Purposive silence/Confusion:—Prolonged unwanted silence when the teacher is either lazy or busy

with register work or homework correction, etc.: includes periods of confusion in which communication can not be understood by the observer and considerable noise and interruptions which disrupt planned activities.

There is no scale implied by these numbers each number is classificatory; designates a particular kind of communication event. The write these numbers down during observation is to enumerate, not to judge a position on the scale.

APPENDIX 6

Science Teacher Behaviour Inventory

SHARMA & VAIDYA
(1973)

Code....................

Name..

Please give the percentage of time, which you spend on the following items :

S. No.	Item	% of time
1	Tr. utilizes students' response/accepts ideas/praises.	
2	Tr. handles/builds students' response.	
3	Tr. summarizes/writes on B. Ed. Obj.	
4	Tr. Poses questions S. A. E.	

5 Tr. gives lecture; facts; concepts, notes.

6 Student-student interaction.

7 Student intiatiates/asks questions.

8 Student gives response.

9 Tr. uses resource material/charts/maps/diagrams.

10 Tr. shows models/demonstrates/Experiments.

11 Tr. provoked to anger/criticizes/penalizes reprimands.

12 Tr. gives direction/commands/moralizing/controls.

13 Tr. admits fault/erspnalig norance/postpones.

14 Tr. supervises.

15 Tr. pauses.

16 Tr. provides opp. to think/students' thinking.

17	Students coyping notes/diagrams etc.
18	Students experimenting (Indi./groups).
19	Interruption by external agency.
20	When no meaningful activity is going on